Neurodiagnostic Instruments Service Manual

For Windows XP-based Endeavor CR, VikingQuest and VikingSelect Systems

February, 2005

VIASYS
HEALTHCARE
Excellence For Life
NEUROCARE GROUP

Part Number 269-603501

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About This Manual

This manual describes the basic theory, field service procedures, and troubleshooting of VIASYS Neurocare's Endeavor CR, VikingQuest and VikingSelect instruments. It is intended for use by a qualified person with electronics or computer repair experience.

VIASYS systems are based on standard computer platforms. For comprehensive information on repairing computer platforms, we recommend a general reference book such as Scott Mueller's Upgrading and Repairing PCs published by Que.

Chapter 2 - System Overview

The System Overview section provides a theoretical basis for understanding the operation of the VIASYS neurodiagnostic systems. The information is in the form of block diagrams, functional descriptions and signal flow diagrams.

Chapter 3 - Hardware Description

The Hardware Description section contains reference information for repairing VIASYS neurodiagnostic systems to the Least Replaceable Unit (LRU) level. Cabling diagrams, board layouts, jumper settings and testing procedures are provided in this section.

Chapter 4 - Software Description

The Software Description section provides an overview of the Windows XP operating system, application programs and utilities provided on the VIASYS neurodiagnostic systems.

Chapter 5 - System Procedures

This chapter contains a variety of step-by-step procedures, from Installation and Set-Up, to System Certification. Where appropriate, checklists accompany the procedures.

Chapter 6 - Troubleshooting

This chapter presents generic and specific troubleshooting procedures for the VIASYS neurodiagnostic systems. Information is organized in accordance with observed symptoms.

Chapter 7

Chapter 7 contains an illustrated parts list for the Endeavor CR, VikingQuest and VikingSelect Least Replaceable Units (LRUs).

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Regulatory Standards

VIASYS Healthcare systems meet the following standards set by domestic and international regulatory agencies:

- UL 2601
- CSA 22.2 M90
- IEC 601-1
- EN 60601-1
- EN 60601-2-26 for Medical Electronic Equipment
- IEC601-1-1

Networked systems meet the standards listed above for leakage and Hi-pot.

To meet these standards when systems other than VIASYS Healthcare systems are connected to the network, the following type of wiring must be used:

- Twisted pair wiring port connected to the network board.

Standard Notations

Specific notations are used in this manual to call attention to conditions which could result in injury, damage to the equipment, or require special attention. Be sure to review the Safety Summary immediately following this definition of notations.

⚠ WARNING ——————

This warning is used to describe an operating or maintenance procedure practice or condition which, if not strictly observed, could result in personal injury or serious damage to equipment.

◇! CAUTION ——————

This caution is used to describe an operating or maintenance procedure, practice, condition or statement which, if not strictly observed, could result in damage to equipment.

NOTE:

This note is used to describe an essential procedure, condition, or statement which requires special attention.

Introduction

Safety Summary

⚠ **WARNING** ────────

DO NOT TURN ON ANY SYSTEM POWER UNTIL ALL CABLES HAVE BEEN PROPERLY CONNECTED AND VERIFIED.

THIS SYSTEM IS NOT EXPLOSION PROOF. DO NOT USE IN THE PRESENCE OF FLAMMABLE ANESTHETICS.

ALTHOUGH PATIENT CONNECTIONS ARE ELECTRICALLY ISOLATED, THESE CONNECTIONS ARE NOT INTENDED FOR DIRECT CARDIAC CONTACT.

THIS EQUIPMENT IS NOT PROTECTED AGAINST DEFIBRILLATION. REMOVE THE PATIENT TO SYSTEM CONNECTION PRIOR TO DEFIBRILLATION. IF DEFIBRILLATION IS APPLIED TO THE PATIENT WHILE CONNECTED TO THE SYSTEM, DAMAGE MAY OCCUR. TEST SYSTEM LEAKAGE CURRENT AFTER DEFIBRILLATION.

ALWAYS USE APPROPRIATE BOVIE PROTECTION DEVICES WITH AMPLIFIERS FOR CONNECTING ALL RECORDING ELECTRODES. USE THE LARGEST SURFACE AREA ELECTRODE POSSIBLE FOR THE PATIENT GROUND ELECTRODE. AVOID PROLONGED ACTIVATION OF THE ELECTROSURGERY UNIT (ESU). AVOID ESU ACTIVATION IN CLOSE PROXIMITY OF THE MONITORING ELECTRODES.

DO NOT ALLOW CONDUCTIVE PARTS OF ELECTRODES AND CONNECTORS TO CONTACT CONDUCTIVE PARTS OR GROUND.

WHEN MORE THAN ONE MEDICAL DEVICE IS CONNECTED TO THE PATIENT, LEAKAGE CURRENTS OF THE DEVICES ARE SUMMED TOGETHER. USE CAUTION.

⚠ **WARNING** ────────

PERIODICALLY CHECK THE SYSTEM GROUND INTEGRITY, THE SYSTEM LEAKAGE CURRENT AND THE LEAKAGE CURRENT OF THE AMPLIFIER.

THIS SYSTEM IS FOR USE WITH THE VIASYS ISOLATION BOX OR THE MEDICAL GRADE POWER SUPPLY ORIGINALLY SUPPLIED WITH THE SYSTEM.

THIS EQUIPMENT USES A THREE WIRE POWER CORD WITH A HOSPITAL GRADE PLUG (FOR INTERNATIONAL APPLICATIONS, IEC 60601-1 APPROVED PLUG). THE CHASSIS IS EARTH GROUNDED. FOR GROUNDING RELIABILITY, CONNECT THE DEVICE TO A HOSPITAL GRADE OR HOSPITAL ONLY RECEPTACLE (FOR INTERNATIONAL APPLICATIONS, IEC 601-1 APPROVED RECEPTACLE). INSPECT THE POWER CORD OFTEN FOR FRAYING OR OTHER DAMAGE. DO NOT OPERATE THE APPARATUS WITH A DAMAGED POWER CORD OR PLUG. IMPROPER GROUNDING IS A SAFETY HAZARD.

USE ONLY VIASYS-SUPPLIED OR VIASYS-APPROVED COMPONENTS, ACCESSORIES AND SOFTWARE ON YOUR SYSTEM. USE OF NON-APPROVED COMPONENTS, ACCESSORIES AND SOFTWARE MAY ADVERSELY AFFECT SYSTEM FUNCTION.

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⚠ WARNING ——————

VIASYS NEUROCARE HAS TAKEN REASONABLE MEASURES TO ENSURE THAT VIASYS SOFTWARE WILL REMAIN UNAFFECTED BY THE PRESENCE OF OTHER, THIRD-PARTY SOFTWARE PROGRAMS. HOWEVER, GIVEN THE VAST NUMBER OF SOFTWARE PROGRAMS AVAILABLE, VIASYS NEUROCARE CANNOT ENSURE COMPLETE IMMUNITY, NOR CAN VIASYS NEUROCARE GUARANTEE IMMUNITY AGAINST SOFTWARE VIRUSES.

ANY USER WHO INSTALLS THIRD-PARTY SOFTWARE ON A VIASYS INSTRUMENT OR ALTERS VIASYS SOFTWARE CODE ASSUMES ALL RISKS AND LIABILITIES IN DOING SO. THE USER WILL BE SUBJECT TO SERVICE CHARGES TO RESTORE THE SYSTEM TO NORMAL OPERATION, EVEN IF THE SYSTEM IS WITHIN THE WARRANTY PERIOD OR UNDER SERVICE CONTRACT.

⚠ CAUTION ——————

Consult a qualified VIASYS Service Representative before reinstalling the system software. Records can be destroyed. Follow the steps in the installation procedure only with the direction of a qualified Service Representative.

Federal US and Canada law restricts this device to sale by or on the order of a medical practitioner licensed by the law of the state in which they practice to use or order the use of this device.

Proper use of this device depends on careful reading of all instructions and labels.

Do not touch the monitor screen with your fingers. You can create a static charge that may affect the display.

Follow all safety standards set by your place of employment

The isolation transformer is a 100, 110, 220 or 240 volt input. Plug its power supply cable only into a 100, 110, 220 or 240 volt external (wall) outlet.

Approved Electrodes: Use only VIASYS approved/supplied electrodes and transducers. See your VIASYS Distributor or call 1-800-356-0007 in the USA. Use of non-approved electrodes or transducers might adversely affect the function of your system.

Electrical shock hazard. Do not remove cover. Refer servicing to qualified service personnel.

Do not overtighten connector securing screws. You may damage components. Hand-tighten all securing screws, or use a small flathead screwdriver with minimum torque.

Preventive Maintenance

Preventive maintenance requires no access to the interior of the instrument and may be performed by the user.

For VIASYS Neurocare systems, preventive maintenance consists of:

- Scheduled file backup and hard drive maintenance procedures, as described in Chapter 5: Routine Backup and Maintenance Procedures.

- Periodically cleaning and inspecting the exterior of the instrument.

It is recommended that you develop a schedule for these purposes.

Inspecting the System

Routinely check the system for secure cable connections and any sign of exterior damage.

Cleaning the System

⚠ **CAUTION** ——————

Turn OFF the system power before cleaning the instrument. Do not permit solutions or sterilization agents to seep into the electronic portions of the system. Take special care around controls, connectors and panel edges. Do not use any abrasive cleaners.

Remove any dust from the exterior of the system with a soft brush or cloth. Use a brush to dislodge any dirt on or around the connectors and panel edges. Remove stubborn dirt with a soft cloth slightly dampened with a mild detergent solution or cold sterilization agent.

When the monitor is on, the screen has a slight static charge, which attracts dust. To remove any dust accumulation, wipe the screen with a soft brush or lint-free cloth. You may use an antistatic spray on the screen to reduce static buildup.

Service

If the system is not functioning properly, do not operate it until all necessary repairs are made and unit is tested for proper functioning in accordance with VIASYS Neurocare published specifications. It is recommended that all repairs be performed by a qualified service representative only.

Periodically check the system ground integrity, the system leakage current and the leakage current of the amplifier.

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Introduction

VIASYS Neurocare's latest generation of neurodiagnostic products run on Pentium 4 platforms using the Windows XP Professional operating system. They are:

- Endeavor CR
- VikingQuest
- VikingSelect

These products are designed to perform tests within the following modalities:

- Electromyography (EMG)
- Nerve Conduction Studies (NCS)
- Evoked Potentials (EP)
- Electroencephalogram (EEG)

This chapter provides the background information and general hardware/software descriptions required to successfully maintain and service these products.

Block diagrams and board descriptions system components are aimed at the LRU (Least Replaceable Unit) level. An LRU is the lowest level assembly that can be efficiently and effectively replaced in the field.

The LRU descriptions are arranged by "functional units" - groups of assemblies related by a common task.

Endeavor CR Portable System

VikingQuest Portable

VikingSelect System

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Test Modality Descriptions

Introduction

This section provides an overview of the test categories performed by VIASYS neurodiagnostic instruments.

Nerve Conduction Studies (NCS)

A nerve conduction study is the recording and analysis of waveforms generated by the peripheral nervous system in response to electric or physiologic stimulation. The recorded waveforms are compound muscle action potentials (CMAPs) and compound nerve action potentials (CNAPs).

The types of nerve conduction studies include:
- Motor Nerve Conduction (MNC)
- Sensory Nerve Conduction (SNC)
- Additional Nerve Studies
- F-Waves
- H-Waves
- Repetitive Stimulation (Rep. Stim.)
- Blink Reflex
- Motor Unit Number Estimate

Compared to an evoked potential, CMAPs and CNAPs waveforms are large in amplitude. The waveform amplitude is measured in milli-volts (mV)

Electromyography (EMG)

Electromyography is the recording and analysis of the insertional, spontaneous an involuntary electrical activity generated by single or group muscle action. The recorded waveforms are called motor unit action potentials (MUAPs).

The types of EMG studies include:
- Spontaneous Activity (SPA)
- Maximum Voluntary Activity (MVA)
- Automatic Motor Unit Potential (AMUP)
- Interference Pattern Analysis (IPA)
- Quantitative EMG (QEMG)
- Single Fiber EMG (SFEMG)

The response amplitude is measured in uV.
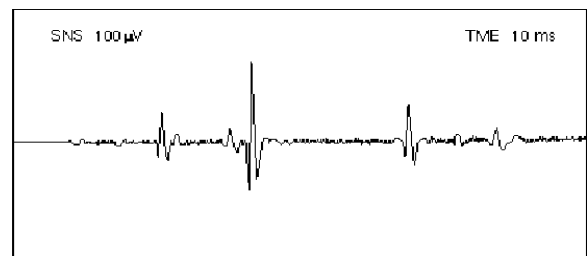
Example of EMG Recording

Example of a Nerve Conduction Study

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Evoked Potentials (EP)

An evoked potential (EP) is an electrical response of the nervous system to a sensory stimulation. EP's are used to check the condition of nerve pathways. A healthy nervous system uses electrical energy to carry messages smoothly along nerve cells to the brain. An EP test will measure the brains's electrical response to the signals sent by the nerves.

The types of evoked potential stimulation are:

• Auditory (ABR, AER, AEP)

• Visual (VEP)

• Somatosensory (SEP)

Each type of response has a unique appearance.

Auditory Brainstem Response

This test is used to check the pathway from the ear to the brain. The ABR is a series of waves that occur within the first 10 msec following the onset of an auditory stimulus. These waves originate from the auditory nerve and auditory nuclei of the brainstem.

Typical system parameters for recording an ABR are:

• Stimulus=Rarefaction Click@75dB nHL

• Rate=11.4 clicks/sec.

• Duration=100usec

• Repetitions=2000

• Low Frequency Filter=30Hz to 150 Hz

• High Frequency Filter=3KHz
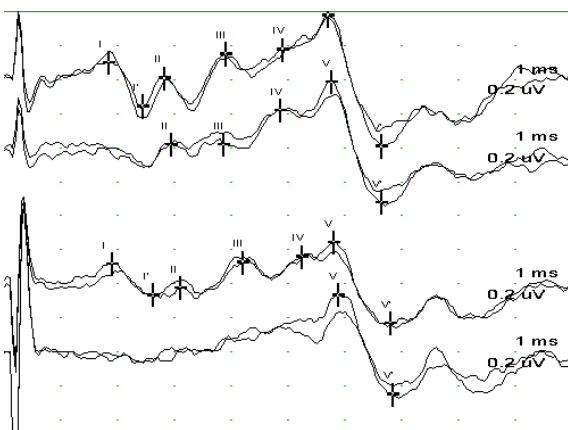
Example of an ABR Recording

Somatosensory Evoked Potential

A Somatosensory Evoked Potential (SEP) is used to evaluate peripheral and central nervous system functions. This test checks the pathway from the nerves in the limbs to the brain. Electrodes are placed at various points along to nerve pathway between the electrical stimulus and the brain. The recorded waveforms indicate the condition of the nerves tested.

Typical system parameters for recording a SEP are:

• Stimulus=Current Pulse set for mild twitch

• Rate=5.1/sec.

• Duration=100usec

• Repetitions=500

• Low Frequency Filter=5Hz

• High Frequency Filter=1.5KHz
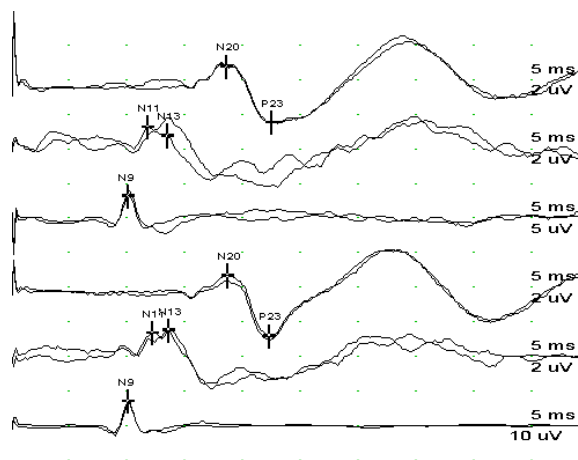
Example of SEP Waveforms

Visual Evoked Potential

A Visual Evoked Potential (VEP) is used to check the neuro pathways from the eyes to the occipital area in the brain. Visual evoked potentials are used to diagnose visual losses due to optic nerve damage, especially from multiple sclerosis. They are also useful to diagnose "hysterical blindness," in which loss of vision is not due to any nerve damage. For a VEP exam the patient focuses on a monitor which displays a reversing checkerboard pattern. For children or others whose attention may wander, LED goggles are used which show the pattern to one eye at a time.

Typical system parameters for a recording a VEP are:
- Stimulus=Reverse Checkerboard (32X32)
- Rate=1.9/sec.
- Repetitions=100
- Low Frequency Filter=1Hz
- High Frequency Filter=100Hz
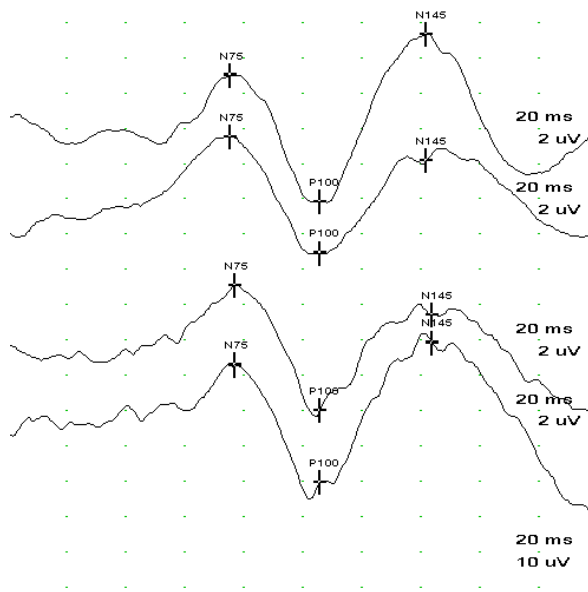
Example of VEP Waveforms

Principles of Signal Averaging

Signal averaging is a method for extracting a small signal from a noisy environment to improve the signal-to-noise ratio. This technique is primarily used for recording evoked potentials

Signal averaging involves applying multiple stimuli and sampling for the response after each stimulus presentation. The response is time-locked to the stimulus, and therefore additive. The ongoing electrical activity is random, and therefore subtractive.

Averaged Signal=$\dfrac{\text{sum of sweeps}}{\text{number of sweeps}}$
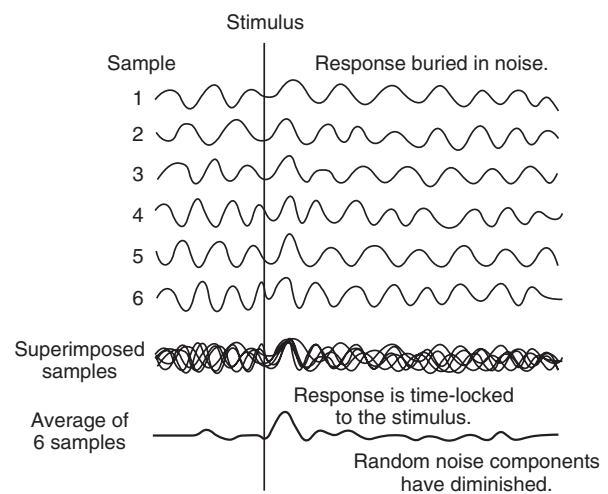
Signal Averaging to Reduce the Effects of Environmental Noise

Types of Noise

There are several categories of background noise that can affect the quality of the evoked response as well as other types of tests done on neurodiagnosic instruments.

System Noise

Stimulus artifact can occur when the patient electrodes pick up electromagnetic radiation from the headphones. Route the headphone leads away from the patient electrode leads to minimize this source of noise. This noise appears as a large spike at the beginning of the trace.

Monitor noise can appear on the incoming signal if the amplifier or patient are too close to display monitor.

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This noise appears as a spike in the waveform with a frequency the same as the monitor sync frequency.

Environmental Noise

The sensitive amplifiers can pick up all kinds of electromagnetic radiation through the electrode leads or power lines. Some typical sources of environmental noise are:

- 50/60 Hz power radiation
- switching noise from light dimmers
- fluorescent lights
- electrocautery instruments
- other electrically powered instruments in vicinity
- nearby radio stations

Typically, these effects are magnified by a poor ground connection at the power receptacle.

Physiological Noise

Muscular artifact is an example of physiological noise. For an ABR, this noise typically comes from tense neck or jaw muscles. Relax the patient.

Reducing Noise Pickup

Try the following suggestions to reduce the pickup of environmental noise:

Electrode Considerations

- Achieve low electrode impedances (<5Kohm).
- Balance electrode impedance (<1.5Kohms difference).
- If using needle electrodes, are they fully inserted? They can act as an antenna if not fully inserted.
- Dress (Braid or Tape) the electrode lead wires together or bundle them up to reduce the effective length.
- Bundle all stimulating electrodes and separate as much as possible from recording electrodes.
- It is recommended that use of all the same type of electrodes. Do not mix metals or types of electrodes.
- Try a different brand of electrodes to eliminate the possibility of common flaw in the type, batch or style of electrodes.
- Use of EEG grounding mats are discouraged as they may act as an antenna for noise.
- Do not place ground in middle of patient chest as you may get EKG residual waves on your waveforms. These residuals look much like 60Hz.
- Use a ground electrode with a large surface area. Do not use a needle electrode as a ground.

Instrument Consideration

- Change the stimulator rate and always use an irregular number. Avoid numbers that are a harmonic of the line voltage and the frequency of the noise you are trying to eliminate.
- Do not let the stim rate exceed the window of acquisition.
- Change to "View Input" mode to view the live signal. Notice if the noise is locked or seemingly triggered. If the noise appears time locked or triggered, adjust the stim rate until it rolls or appears randomly throughout the trace. This should make the noise average out in the "View Averaged" mode.
- Run a base line in the room with all other equipment turned off and unplugged.
- Run a base line in another room or location. The more distant the location the better.
- Put a loose knot in the power cord to disrupt the antenna effect of the cord.

Power Considerations

- Typically, hospital "Isolated" receptacles are extremely noisy. Have them checked.
- Plug the instrument into another wall receptacle.
- Check receptacle for proper ground and proper negative and neutral using an ECOS meter.
- Check to see what other equipment is powered from the same electrical circuit. The other equipment may be the source of the noise.

Neurodiagnostic Instrument - Generic Block Diagram
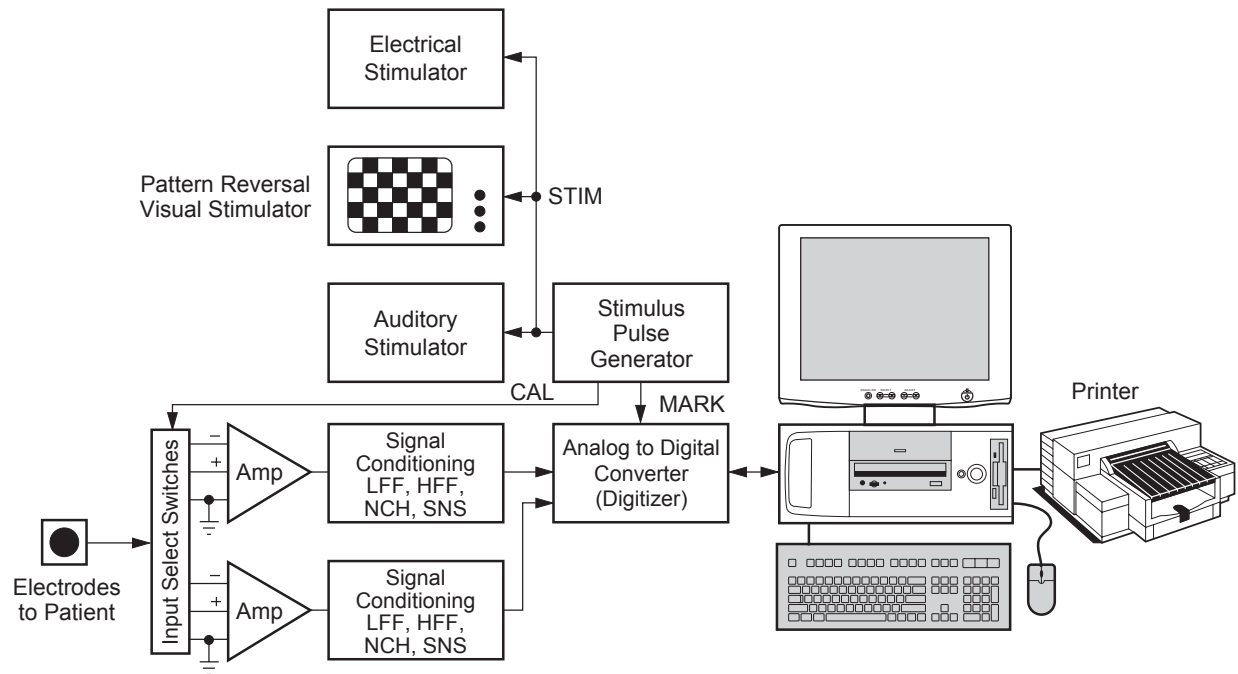
Generic NCS/EMG/EP System

The diagram above represents a generic NCS/EMG/EP system. This section describes the functions of the blocks that make up this basic system. Later these blocks will be broken down into the specific functional blocks that compose each VIASYS neurodiagnostic system.

Patient Interface

Electrodes and Headbox

Electrodes connect the patient to the system. The electrodes generally plug into some type of headbox or amplifier module.

Electrode Select Switches

Mechanical or electronic select switches direct the selected electrode leads to the appropriate amplifier channels. The Endeavor CR 16-channel amplifier and the VikingSelect ES-8 amplifier are the only amplifiers available with electrode switching.

Impedance Measurement Circuit

An impedance measure circuit lets the user measure the integrity of the patient-to-electrode connection. This is necessary to check that the recording electrodes have been applied properly.

Amplifier

The input amplifier is typically an isolated differential amplifier with a large voltage gain. This stage amplifies the difference in the signal applied between the positive and negative inputs (the patient signal). The use of a differential amplifier allows the amplifier stage to reject unwanted environmental signals applied to both inputs, while amplifying the patient signal. The measure of the amplifier's ability to reject these signals is called the Common Mode Rejection Ratio (CMMR).

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Signal Conditioning

The energy of each type of evoked response lies within a well-defined band of frequencies. The signal conditioning block reduces frequencies outside of this window of interest in an effort to "clean up" the waveform before averaging takes place. The signal condition block also adjusts the signal amplitude for optimum results. The component blocks of this stage are:

Low Frequency Filter (LFF)

The low frequency filter reduces the amplitude of the signals below the frequency band of interest. This filter is also referred to as a high pass filter (HPF).

High Frequency Filter (HFF)

The high frequency filter reduces amplitude of signals above the frequency band of interest. This filter is also referred to as a low pass filter (LPF)

Notch Filter (NCH)

This is a narrow band filter that reduces amplitude of 50Hz or 60Hz line interference. The use of this filter is discouraged as it can mask poor electrode application techniques and is in the middle of the VEP and SEP waveform bands. The notch filter may be used when there is no other means of reducing line interference. This can allow patient signals to be recorded in an environment that would otherwise result in unacceptable patient signals.

Sensitivity Stage (SNS)

The sensitivity stage sets the overall voltage gain of the conditioned patient input signal. The sensitivity range is typically 10uV full screen (a voltage gain of 500K) to 100mV full screen (a voltage gain of 10).

Stimulators

The stimulators provide a single or repetitive stimulus to the patient. The are three typical types of stimulators that are used on a NCS/EMG/EP system. They are the Electrical Stimulator, the Auditory Stimulator, and the Visual Stimulator.

Electrical Stimulator

The electrical stimulator is used to provide a small electrical signal to the patient. VIASYS instruments support two types of electrical stimulation: constant current and constant voltage.

The constant current range for VIASYS instruments is 0-100mA. When using the electrical stimulator is this mode, the stimulator will try to maintain the selected current level, regardless of how much voltage it takes to overcome the skin impedance. If the stimulator is unsuccessful, the system displays an "Impedance Limited" message.

The constant voltage mode delivers a selected voltage level to the patient. The constant voltage range for VIASYS instruments is 0-400V.

Auditory Stimulator

The Auditory Stimulator provides a click or a tone stimulus. The system user controls the stimulus rate, duration, intensity level and polarity. The three types of click polarity are:

- Rarefaction - the earphone diaphragm moves away from the ear.
- Condensation - the diaphragm moves toward the ear.
- Alternating - the diaphragm will deliver a rarefaction stimulus and condensation stimulus every other stimulus.

The variable tone parameters are frequency and envelope shape. The envelope variables are rise/fall time and plateau time.

The Auditory Stimulator also provides noise masking. When stimulus levels higher than 95dB are delivered to the patient, the stimulus can travel by bone conduction to the non-test (contralateral) ear. Noise masking applied to the non-test ear prevents it from contributing to the evoked response.

Visual Stimulators

Pattern reversal and flash are the two types of visual stimulators. The VIASYS model 2015 Visual Stimulator presents a reversing checkerboard pattern to the patient. This stimulus produces a short duration evoked response that is better defined than with flash stimuli.

Flash stimulators, such as the LED Goggles or a photic strobe light, produce a longer duration response that is less well-defined than a checkerboard stimuli.

Stimulus Pulse Generator

This block produces the signal that fires the stimulators. The stimulus pulse from this block goes to each type of stimulator and results in:

- A click or tone to the ear
- A flash or checkerboard pattern reversal on the visual stimulator
- An electrical pulse delivered to the surface of the skin

The system user sets the stimulus pulse rate and duration to values appropriate for each type of test.

The Stimulus Generator block also produces an internal calibration pulse. The calibration pulse goes to the input select switches. The calibration pulse permits you to conduct an integrity check of the blocks that process the patient signal.

Analog-to-Digital Converter

The Analog-to-Digital Converter changes the incoming analog signal to a series of digital values that represent the data. This device runs continuously during data acquisition, sending a constant stream of digital values to system memory. The A/D converter produces a 16-bit digital value.

At the output of the A/D converter, 16 bits are added to the digitized data to create a 32-bit data stream. The additional 16 bits are designated marker bits. Markers identify significant events associated with the data stream, such as the occurrence of a stimulus pulse or the press of the foot switch.

The mark provides a way for the computer to locate and extract the important segments from the data stream.

Computer Platform

The computer platform runs the VIASYS applications that manage patient demographics, set up amplifier/stimulator parameters, and process the incoming patient data.

The Endeavor CR and VikingQuest can be configured around a desktop or laptop computer with the following minimum specifications:

- Pentium, 3.2GHz CPU or better
- 512MB RAM minimum
- 80GB or higher IDE hard drive
- 1024 x 768 pixel graphics or better
- Two or more USB ports
- CD or DVD Writer

The VikingSelect requires a desktop computer to accommodate a PCI firewire interface card.

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Endeavor CR

Introduction

The Endeavor CR is a neuromonitoring system especially designed for surgical monitoring and Intensive Care monitoring. Endeavor CR software acquires multiple data types and provides instantaneous screen updates. The system can acquire and record different data types at the same time.
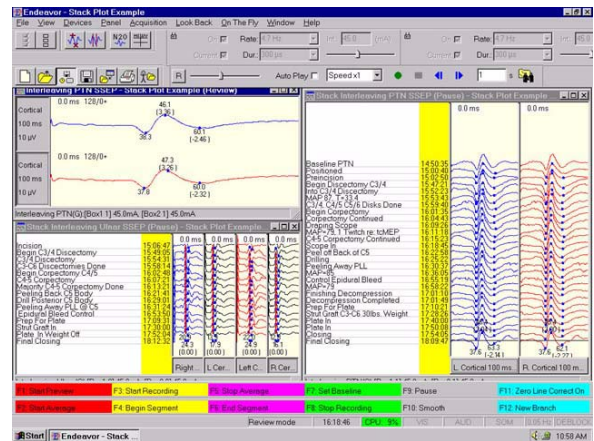

Endeavor CR System

The Endeavor CR amplifier has 16 channels and is equipped with two headboxes and 44 active electrode inputs. Each channel can be independently configured as either a true referential or a true differential channel. Having this flexibility in a neuromonitoring amplifier means that you can select the mode that best suits your need.

The Endeavor CR amplifiers are based on the AES interface technology. The Endeavor CR amplifier is designed to consistently record clean, reliable data in a variety of electrically hostile environments often associated with the neuromonitoring patient. During motor evoked potentials with transcranial electrical stimulation, the Endeavor CR amplifiers allow for a "software disconnect" of the scalp electrodes that prevents electrical stimulus contamination of the peripheral data.

New methods synchronize stimulus presentation, data collection, and analog-to-digital conversion to allow you to replay an original signal, change the montage, define new filters, or even re-average from the raw data.

Endeavor CR applications and features are:
- Auditory Evoked Potentials (AEP)
- Somatosensory Evoked Potentials (SEP)
- Electromyography (EMG)
- EP's using external stimulators (MEP)
- Visual Evoked Potentials (VEP)
- Electro-Encephalography (EEG)
- Compressed Spectral Analysis/Compressed Density Spectral Analysis (CSA/CDSA)
- Real-Time Quantitative Analysis with simultaneous live waveform display, charts and alphanumeric data.

Sample Patient Data Screen

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Endeavor CR Block Description

This section describes the Endeavor CR system at the block level. The order of topics is:

1. Computer Platform

2. Base Unit

3. Amplifier System

4. Stimulators

Computer Platform

The System Controller is a notebook or desktop computer that connects to the Endeavor CR base unit via USB port. The minimum requirements for the computer are:

• Pentium 4, 3.0GHz or higher (desktop) or Centrino 1.4GHz (laptop)
• 512MB system RAM or greater
• 80GB or larger hard drive
• USB 2.0 port
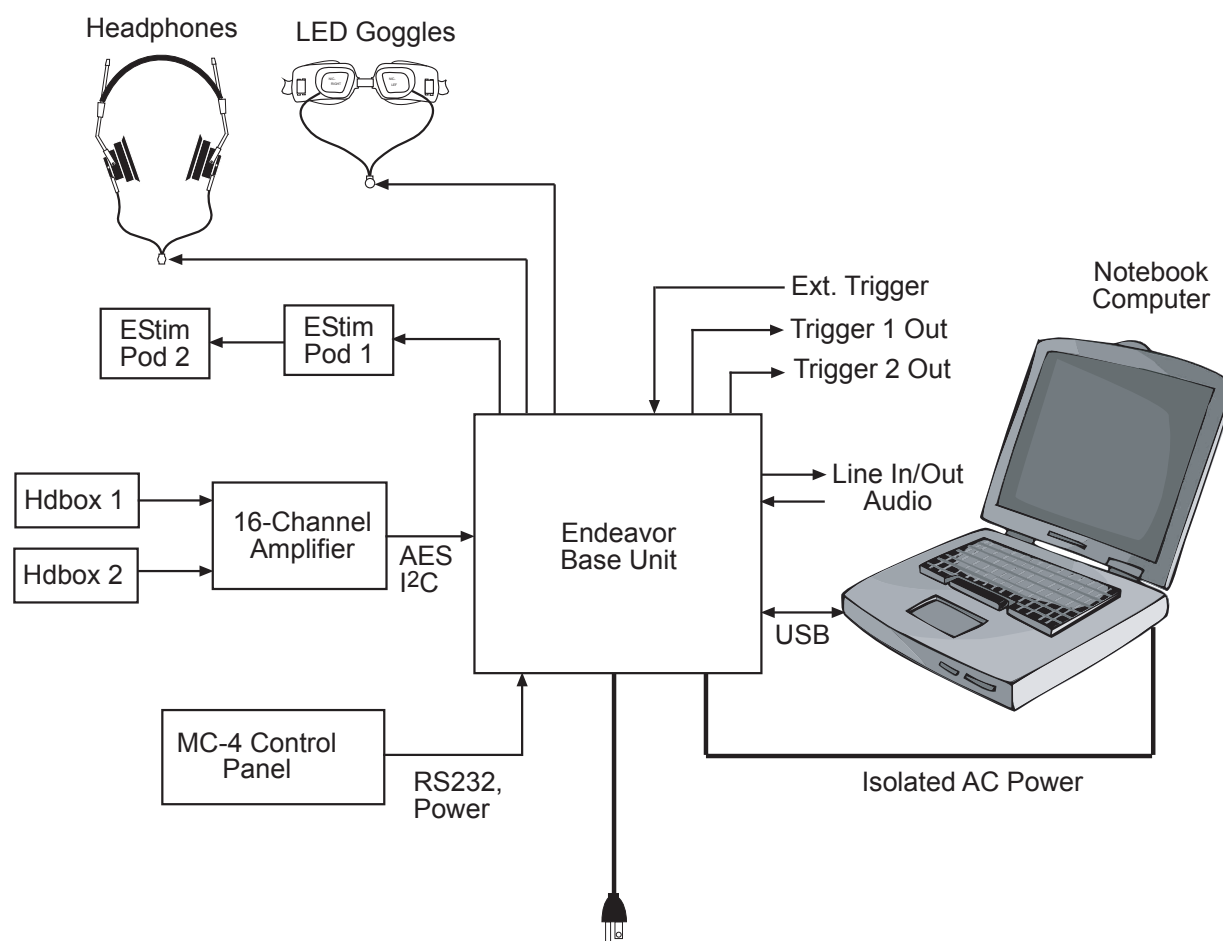
Endeavor CR System Components

Base Unit

The Base Unit contains a majority of the electronics for the Endeavor CR. This includes:

• Isolated power supply
• Stimulus/trigger pulse generator
• Electrical stimulus generator
• Auditory stimulus generator
• EMG speaker

Endeavor CR Base Unit

The Base Unit is considered a Least Replaceable Unit (LRU) and therefore contains no customer serviceable parts.

The power supplies for the base unit and laptop computer meet leakage current specifications for medical devices, therefore no external isolation power supply is required for portable systems.

Desktop systems require an isolated power supply.

Amplifier System

The amplifier system consists of a 16-Channel Physiological Amplifier, two headboxes, and interface cables. The 16-channel amplifier and headboxes are Least Replaceable Units and contains no customer serviceable parts.

16-Channel Amplifier
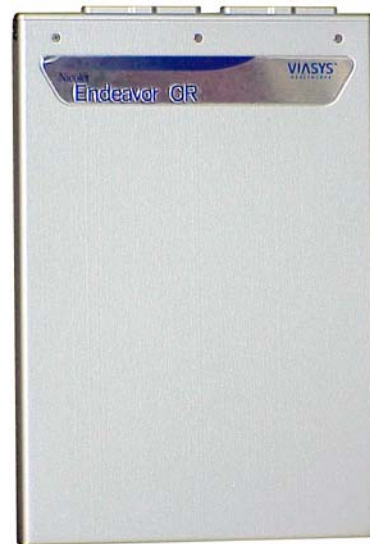
16-Channel Amplifier

Headboxes

HB-1 and HB-2 headboxes are functionally identical, except for the identifying labels. ID registers in each headbox allow the system to distinguish HB-1 from HB-2.

HB-1 & HB-2 Headboxes

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Stimulators

The Endeavor CR Base Unit directly produces the electrical current stimulus and visual stimulus (using LED goggles).

Stimulus timing control of rates, durations, train pulse count and interval, and electrical stimulus level and output pair locations are all handled in the electronic hardware under software control. In addition, two external trigger outputs along with a trigger input are available for the control and monitoring of externally generated stimuli.

Electrical Stimulating System

The electrical stimulus generator resides on the Endeavor CR Base Unit circuit board. A single electrical stimulus source is switched to various output locations to produce the functionality of four independent electrical stimulus generators.

Stimulus pulses may be presented at repetitive rates or as single non-recurrent pulses or may be applied as a train of two or more pulses, depending on the application.

A rear panel connector on the Base Unit provides the connection to Stimulus Pod 1. Stimulus Pod 1 connects to Stimulus Pod 2. The Stimulus Pods distribute selected stimulus pulses to one of 12 pairs of stimulating electrodes.

SP-1 & SP-2 Stimulus Pods

Stimulus Pod 1 also provides a connector for an S402 Stimulus Probe, and a pair of LL connectors for outputting a Low Level electrical stimulus, which cannot exceed 10mA intensity level.

Auditory Stimulator

The Endeavor CR Base Unit contains an Auditory Stimulator daughter board that provides direct outputs to a transducer. Possible transducers are shielded and unshielded TDH-39 headphones and TIP 300 Tubal Inserts.

MC-4 Control Panel

MC-4 Control Panel

The MC-4 Control Panel provides controls to set individual stimulus intensity levels for up to four stimulation sites. There are also a Volume Control knob and Mute switch for the EMG speaker. The Control Panel connects to the base unit via a dedicated serial link.

Visual Stimulators

A rear panel connector provides the link for the LED Goggles stimulator A separate Trigger Out connector controls stimulus delivery for the VIASYS 2015 Pattern Reversal Visual Stimulator.

VikingQuest

Introduction

This section describes the VikingQuest system at the block level. The order of topics is:

1. Computer Platform

2. Base Unit

3. Amplifier System

4. Stimulators

Computer Platform

The System Controller is a notebook computer that connects to the VikingQuest unit via USB port. The minimum requirements for the computer are:

- Celeron, 1.2GHz or higher (portable)
- 256MB system RAM or greater
- 80GB or larger hard drive
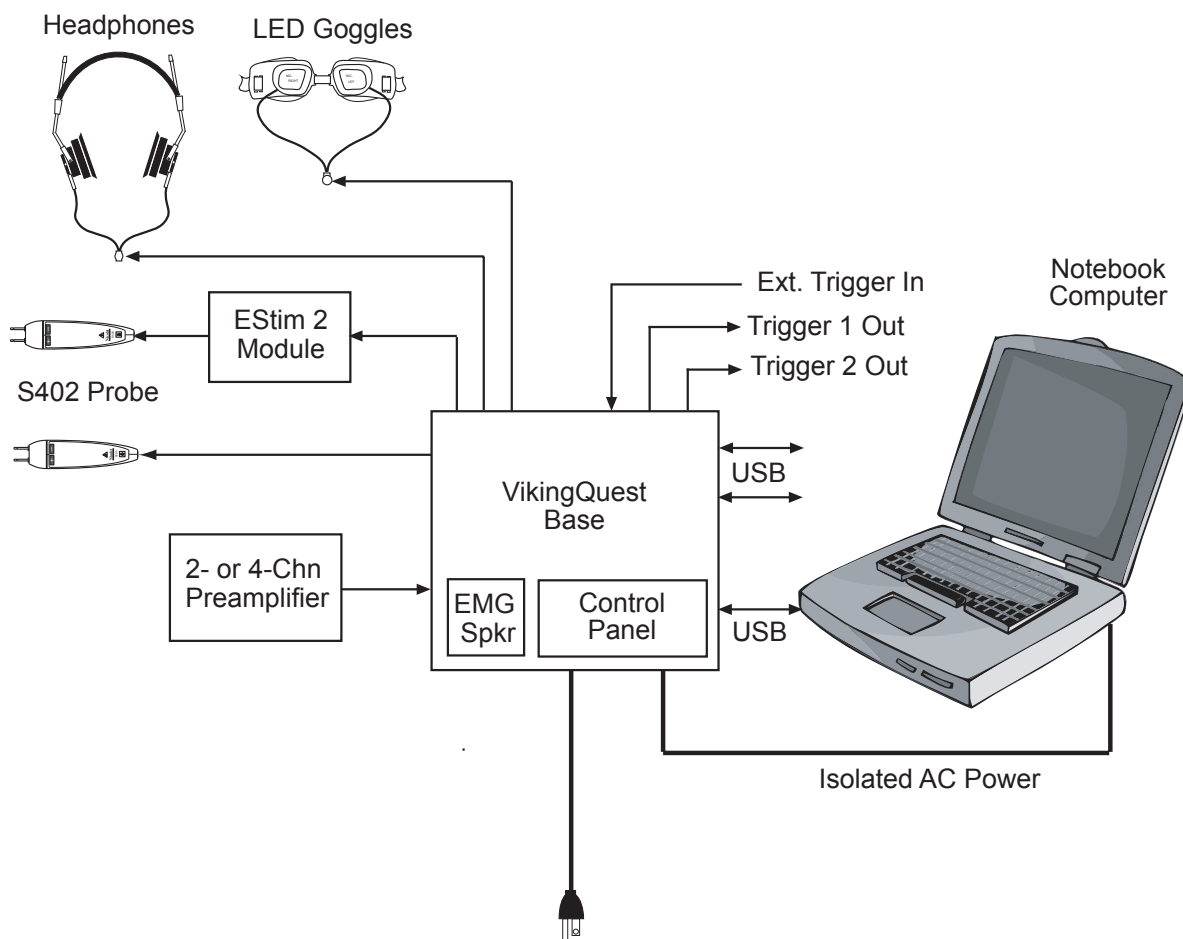
VikingQuest Block Diagram

Neurodiagnostic Instruments Service Manual

Base Unit

The Base Unit contains a majority of the electronics for the VikingQuest. This includes:

- Isolated power supply
- Stimulus/trigger pulse generator
- Electrical stimulus generator
- Auditory stimulus generator (optional)
- Temperature probe interface (optional)
- EMG speaker

VikingQuest Base Unit

The Base Unit is considered a Least Replaceable Unit (LRU) and therefore contains no customer serviceable parts.

The power supplies for the base unit and laptop computer meet leakage current specifications for medical devices, therefore no external isolation power supply is required for portable systems.

Amplifier System

The amplifier options are a 2- or 4-channel amplifier. The amplifier modules contain the electrode input connectors and the differential input amplifiers. The remaining blocks of the amplifier system (the filters and A/D converter) reside on the Base Unit's mother board. There are no headboxes or electrode switching options for the VikingQuest. The amplifier modules are Least Replaceable Units and contain no customer serviceable parts.

VikingQuest 2- and 4-Channel Amplifier Modules

Stimulators

The VikingQuest Base Unit's mother board produces the electrical current stimulus and visual stimulus (using LED goggles). An Auditory Stimulator daughter board produces the auditory stimulus.

Stimulus timing control of rates, durations, train pulse count and interval, and electrical stimulus level are all handled in the electronic hardware under software control. In addition, two external trigger outputs along with a trigger input are available for the control and monitoring of externally generated stimuli.

Electrical Stimulating System

The electrical stimulus generator resides on the VikingQuest Base Unit's mother board. One output connector on the base unit's rear panel connects directly to an SM402 Stimulus Probe. A second connector is provided for the Electrical Stimulator 2 Option.

VikingQuest Electrical Stimulator 2 Option

Control Panel

VikingQuest Control Panel

The XP-based VikingQuest features a simplified Control Panel integrated onto the base unit. The Control Panel provides controls to set individual stimulus intensity levels for two stimulation sites and Mute switch for the EMG speaker. The Control Panel connects to the base unit via a dedicated serial link.

Auditory Stimulator

The VikingQuest base unit contains an Auditory Stimulator board that provides direct outputs to a transducer. Possible transducers are shielded and unshielded THD-39 headphones and TIP 300 Tubal Inserts.

Visual Stimulators

A rear panel connector provides the link for the LED Goggles stimulator A separate Trigger Out connector controls stimulus delivery for the VIASYS 2015 Pattern Reversal Visual Stimulator.

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VikingSelect

Introduction

This section describes the VikingSelect at the block level. The order of topics are:

1. Power and Power Distribution

2. Computer Platform

3. Patient Signal Path

4. Stimulators

Power Distribution

The power supply and power distribution system for the VikingSelect contains the following components:

• FireWire Isolation power supply (GII cart)

• Isolation/FireBrick power supply (UniBody cart)

FireWire Isolation Power Supply

The FireWire Isolation power supply provides isolated A.C. power to the GII cart-mounted assemblies and auxiliary D.C. power to the Stimulus Controller, and the FireWire Amplifier assemblies.The FireWire Isolation power supply is designed to receive A.C. voltages of 100, 120, 220, and 240VAC. There are two A.C. voltage selector switches: one for input voltage selection and the other for output voltage selection.
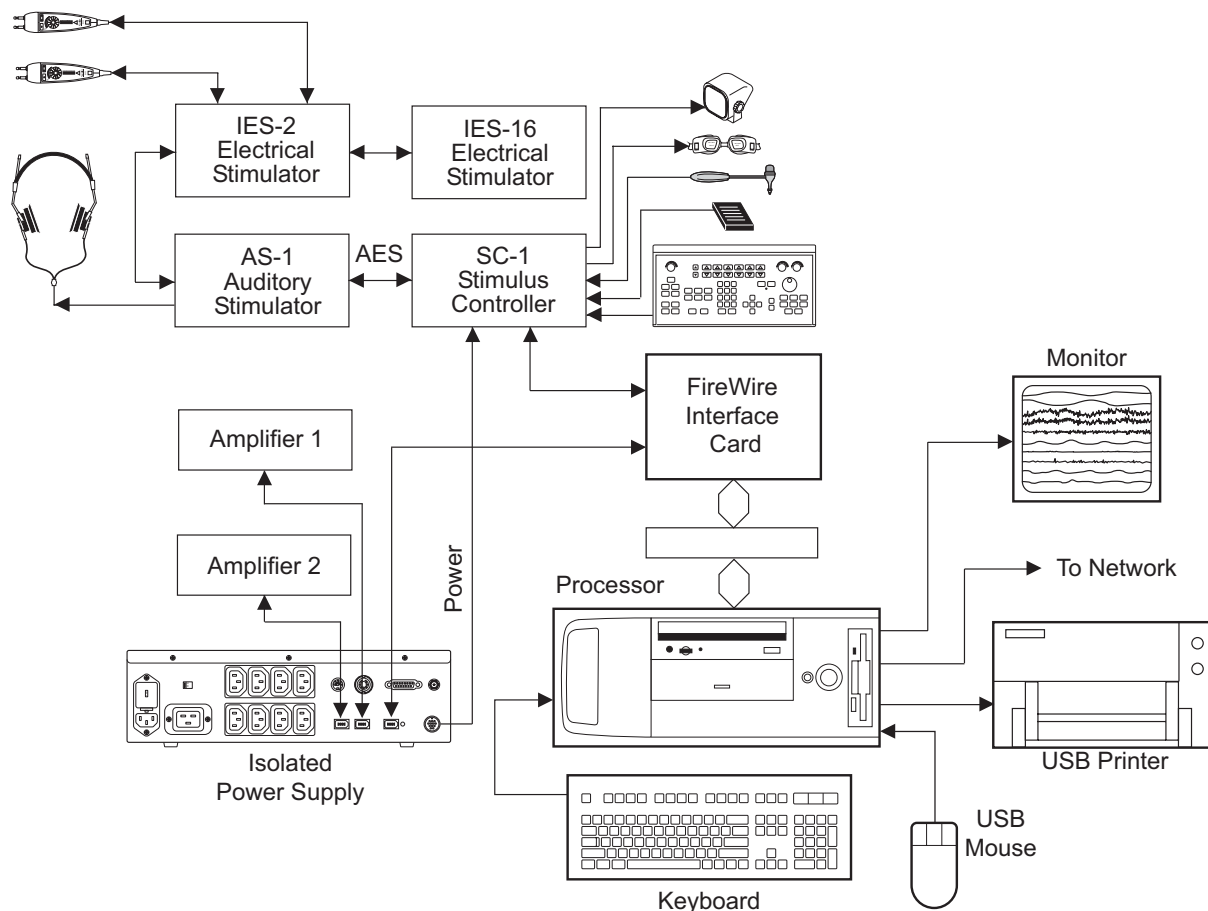
VikingSelect Acquisition Station Components

Neurodiagnostic Instruments Service Manual

FireWire Isolation Power Supply

Isolation Power Supply

The Isolation power supply provides A.C. power to cart-mounted assemblies and D.C. power to the Stimulus Controller and the FireWire Amplifiers.

Computer Platform

The Windows XP-based VikingSelect system is built on a Pentium 4, 3.2GHz or higher platform running the Windows XP operating system.

The system currently ships with an Intel D865GLC motherboard. This motherboard provides integrated sound, video, and network functions as well as eight USB ports and legacy I/O ports.

The standard computer platform contains:

- 512MB RAM
- 80GB IDE hard disk
- CD-Rewritable drive
- 3.5" 1.44 MB floppy drive
- FireWire interface card
- PS/2 104-key keyboard
- USB mouse
- Multimedia speakers (built-in)

System options include:

- Printer

Patient Signal Path

The patient signal path include all the components that are involved in collecting and processing the patient signals. The following components are part of the patient signal path.

- EA-2 EMG Amplifier
- EA-4 EMG Amplifier
- ES-8 EP Amplifier
- ET-16A(B) Headbox and cable
- FireWire Isobox (or FireBrick) power supply
- FireWire Interface card
- FireWire cables connecting these components.

FireWire Amplifiers

There are three amplifiers available for the VikingSelect system. They are the EA-2, the EA-4 and the ES-8. All amplifiers contain the amplification stage, the signal conditioning, and the analog-to-digital blocks. The ES-8 amplifier also contains input select switches and has a headbox to interface with the patient electrodes. The EA-2 and EA-4 have electrode jacks built into the amplifier to interface with the patient electrodes.

All these amplifiers use a FireWire interface to transfer digital patient data to the computer system.

EA-4 EMG Amplifier
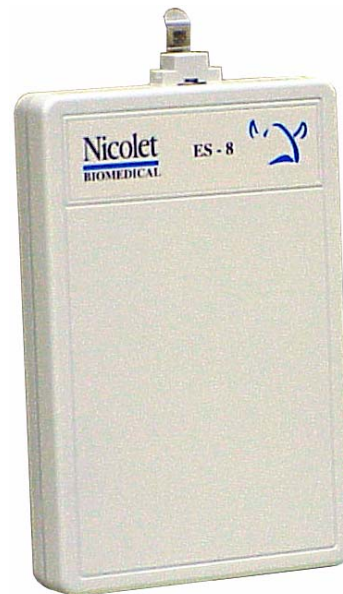
ES-8 EP Amplifier

EA-2 EMG Amplifier

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ET-16A (B) Headboxes

ET-16A & B Headboxes

The ET-16 headboxes provide an interface between the ES-8 amplifier and the patient electrodes. The ET-16A and ET-16B provide 32 different electrode inputs into the input select switches of the ES-8 amplifier. The ET-16A input labels are 1 through 16, and the ET-16B input labels are 17 through 32. The ET-16A and B headboxes are only used on the ES-8 amplifier and are the only electrode inputs available on the ES-8 amplifier.

ET-208 Headbox

The ET-208 headbox provides an interface between the EA-4 or EA-2 amplifier and the patient electrodes. The ET-208 headbox cannot be used with the ES-8 amplifier. The ET-208 has eight pairs of electrode inputs and eight concentric connections that can interface with the EA-2 or EA-4 amplifier.

ET-208 Headbox

Stimulators

The stimulator system consists of the following least replaceable units:

- SC-1 Stimulus Controller
- AS-1 Auditory Stimulator
- IES-2 Clinical Electrical Stimulator
- IES-16 O.R. Electrical Stimulator
- Transducers

The new stimulators are external and independent of the computer platform. The communication interface between the computer and the SC-1 Stimulus Controller module is via the FireWire card. The Stimulus Controller module communicates to the other stimulator modules by the AES (Audio Engineering Society) standard, a high-speed serial interface.

Hot Plugging

We have defined hot plugging as: The ability to plug in a module with power on and not destroy or damage the module. We do support hot plugging, however we do not recommend it. We do not support plug and play. We define plug and play as: The ability to plug in a module with power on and have the application software recognize that a change has occurred, then take appropriate action. No AES bus hardware messaging exists to inform the application that a module has been added or removed. The only way the application knows what modules have been changed is to poll the modules with a roll call.

SC-1 Stimulus Controller

The SC-1 Stimulus Controller performs the same functions that were performed by the D-Stim I/O board in the original VikingSelect and Endeavor. The input/output connections on the SC-1 are:

- EMG speaker
- Trigger 1 out
- Trigger 2 out
- Ganzfeld
- Reflex Hammer
- Trigger in
- LED Goggles
- Power
- AES communication
- FireWire
- Footswitch
- Control Panel

SC-1 Stimulus Controller

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AS-1 Auditory Stimulator

The AS-1 Auditory Stimulator provides a click or a tone stimulus. The system user controls the click rate, duration, intensity level and polarity.

The variable tone parameters are frequency and envelope shape. The envelope variables are rise/fall time and plateau time.

The auditory stimulator module is basically a digital to analog converter with analog attenuation. The auditory stimulator board converts a digital audio stream into a left and a right analog audio output. Each analog channel is capable of 140dB SPL output level. The analog signal can be attenuated, with hardware, to a maximum attenuation level of -140dB in 1dB steps. All clicks, tone bursts, noise, signal mixing and continuous tones are generated in the auditory Digital Signal Processor (DSP) located within the SC-1 Stimulus Controller module.

AS-1 Auditory Stimulator

The AS-1 has a left and a right output jack for a 300 ohm transducers such as TDH-39 headphones, TIP-300 tubal inserts, or bone vibrator.

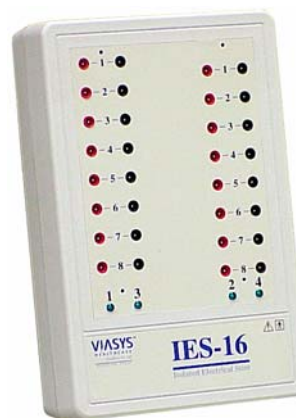## IES-2 Clinical Electrical Stimulator

The IES-2 is a single module with two independent channels of isolated electrical stimulation. Each channel has a seven pin DIN connector to accommodate an S403 Stimulus Probe and a pair of DIN 42 802 electrode outputs.

IES-2 Clinical Electrical Stimulator

IES-16 O.R. Electrical Stimulator

The IES-16 is a single module with two independent channels of isolated electrical stimulation. Each independent channel has eight DIN 42 802 electrode pair outputs. Only one electrode pair, from each channel, is active at a time. The system software controls which output pair is active. There are no connectors for the S403 Stimulus Probe.

IES-16 O.R. Electrical Stimulator

Software

VIASYS Neurocare's latest generation of products run on the MS Windows XP Professional operating system.

Each system has its own unique application for conducting Evoked Potential (EP), Electromyography (EEG), and Nerve Conduction (NCS) studies. Other software may be installed based on the options in the system.

The following list defines the software applications found in the VIASYS systems:

Universal

- MS Window XP Professional
- MS Office (option)
- Multi-Language Interface Software for XP (option)
- NicVue Patient Administrator Software Version 2.6 (option)

Endeavor CR

- Endeavor Monitoring Software
- Endeavor Review Software Package

VikingQuest

- AEP Software Package
- EMG Software Bundle (SPA, MVA, QEMG, EMG Free Run Storage with Replay)
- MMP PLUS Software Package
- NCS Reference Values Software (Requires NCS)
- NCS Software Bundle (MNC, SNC, ANS, F Waves, H Waves, Blink Reflex, Repetitive Stimulation)
- P300 Auditory (P300A) Software Package
- Report MSW
- SEP Software Package
- SFEMG Software Package
- VEP Software Package
- VQ Networking Software Package

VikingSelect

- EMG Software Package (SPA, MVA)
- EOG/ERG Software Package
- Evoked Potential Standard Software Package (3-Modality)
- Intra Operative Monitoring Software Package
- Intra Operative Monitoring with Processed EEG Software Package
- MMP PLUS Software Package
- NCS Reference Values Software Package
- NCS Software Package
- NCS/EMG Software Package Bundle
- Networking Software Package
- P300 Auditory (P300A) Software Package
- QEMG Plus Software Package (QMUP, QMVA, QNS, AMUP, IPA)
- QEMG Software Package (QMUP, QMVA, QNS)
- Report MSW Software Package with MS Office
- Report MSW Software Package without MS Office
- SEP Plus Software Package
- Single Fiber EMG Software Package
- VEP Plus Software Package

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Introduction

This chapter contains the reference information required to configure, cable, adjust and repair the Endeavor CR, VikingQuest and VikingSelect. The information is organized around "functional units" - the set of hardware and software items that together, perform a specific function.

The information in this chapter is structured under the following headings:

System Cabling

This section shows the external cabling options for cart-based and portable systems, and provides part numbers for each cable.

Power Supplies and Power Distribution

This section covers the power sources for VIASYS Neurocare products and power distribution paths.

Computer Platforms

This section defines the specifications and the standard BIOS settings for computer platforms used with VIASYS Neurocare instruments. Board placement diagrams are also provided.

Computer Peripherals

This section covers the input/output devices that connect directly to the desktop computer motherboard:
- Floppy Drive
- Hard Drive
- CD Writer
- DVD Writer (option)
- Keyboard and Mouse
- Printers

Display

This section covers the units responsible for displaying the various combinations of the patient image, scrolling data, and computer-generated graphics/text. This includes:
- Graphics Controller (on-board)
- Monitors

Network

This section covers the hardware and software components that make up the system network.

Stimulators

This section covers the stimulator options. These include:
- Stimulus Pulse Generators
- Visual Stimulators
- Auditory Stimulators
- Electrical Stimulators

Patient Signal Path

This section covers the units responsible for acquiring and processing the patient data. This includes:
- Endeavor CR 16-Chn IOM Amplifier and Headboxes
- VikingQuest 2- and 4-Chn Preamplifiers & Base Unit
- VikingSelect 2- and 4-Chn EP/EMG Amplifiers
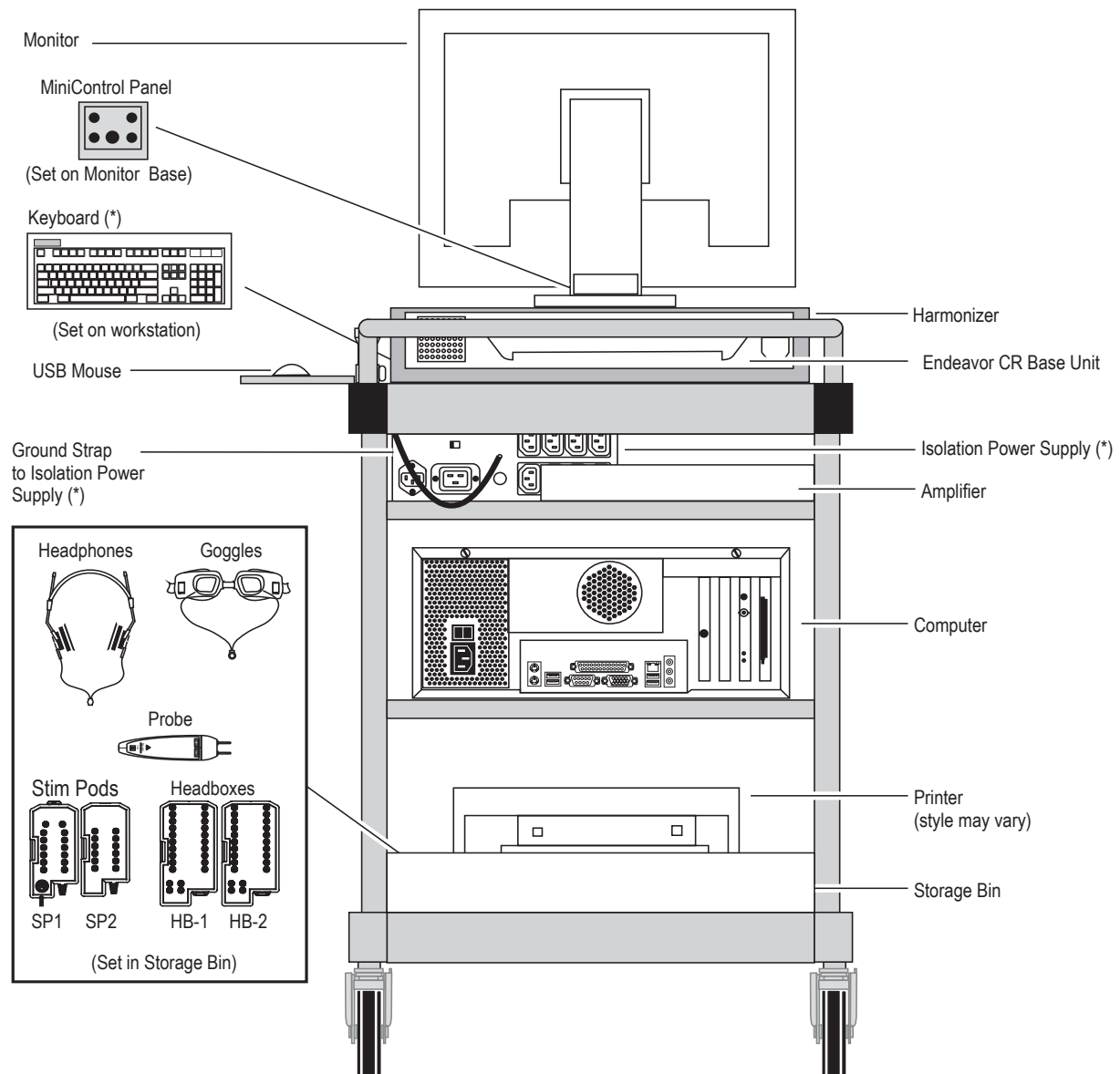- VikingSelect 8-Chn IOM Amplifier & Headboxes

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Cabling Diagrams

Endeavor CR Cabling - Unibody Cart Module Locations

The Unibody cart is an option for both the Endeavor CR
portable and desktop systems.

Monitor

MiniControl Panel

(Set on Monitor Base)

Keyboard (*)

(Set on workstation)

USB Mouse

Ground Strap
to Isolation Power
Supply (*)

Headphones   Goggles

Probe

Stim Pods   Headboxes

SP1   SP2   HB-1   HB-2

(Set in Storage Bin)

Harmonizer

Endeavor CR Base Unit

Isolation Power Supply (*)

Amplifier

Computer
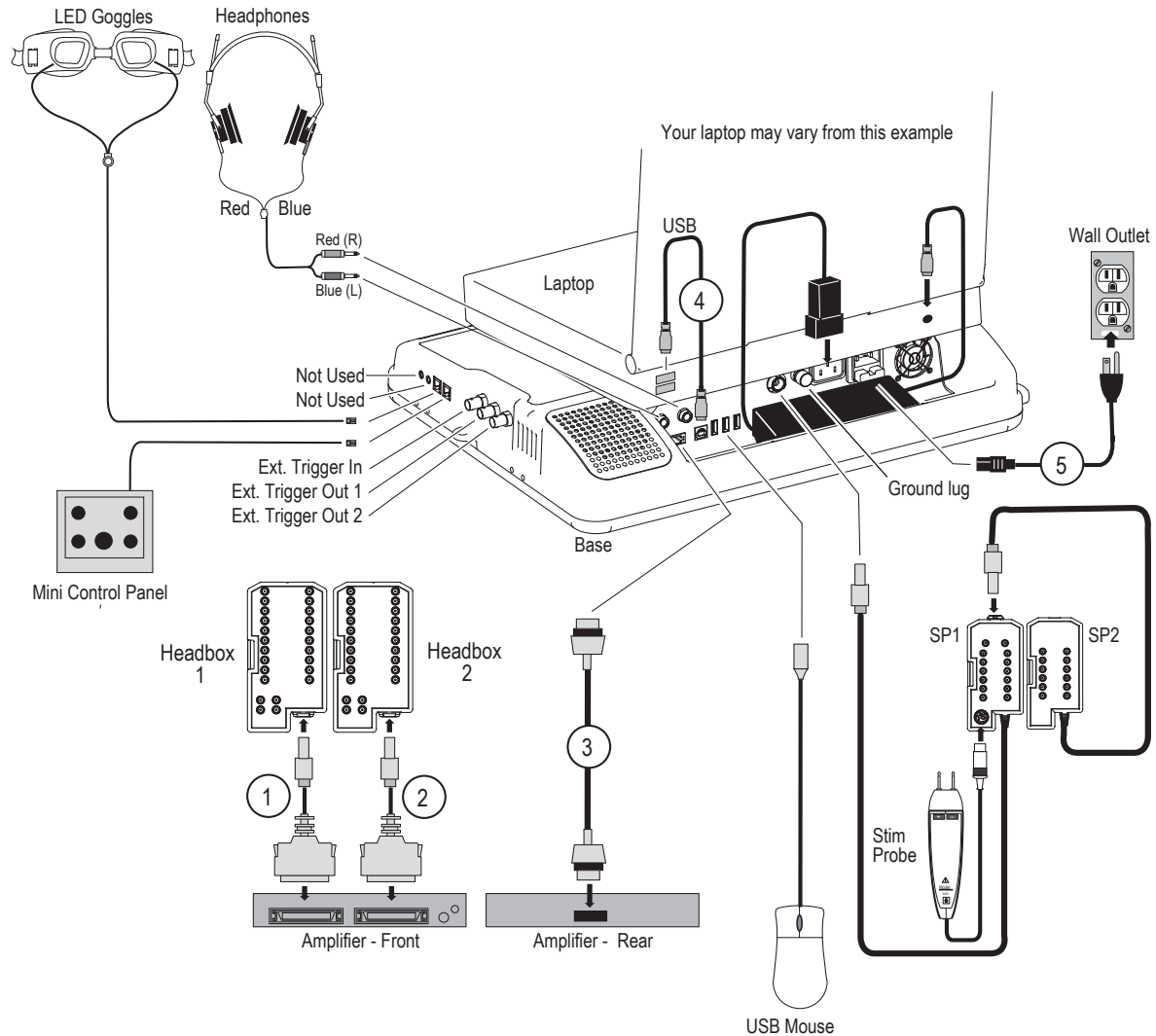
Printer
(style may vary)

Storage Bin

(*) These components are used only with Desktop systems.

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Endeavor CR Portable Cabling

The diagram below provides the proper connections for the Endeavor CR portable system.

Refer to the bottom of the page for cable identifications and corresponding part numbers.

System Cabling Numbers, Part Numbers and Cabling Descriptions

Cable Number	Cable Description	Cable Part Number
1, 2	Headbox Cable, 6 ft. Headbox Cable, 15 ft.	085-4576xx 085-4580xx
3	Amplifier Cable	085-4567xx
4	Base/Laptop Interface Cable, USB	085-4581xx
5	Power Cord (USA)	085-4247xx

Endeavor CR Desktop Cabling - Computer
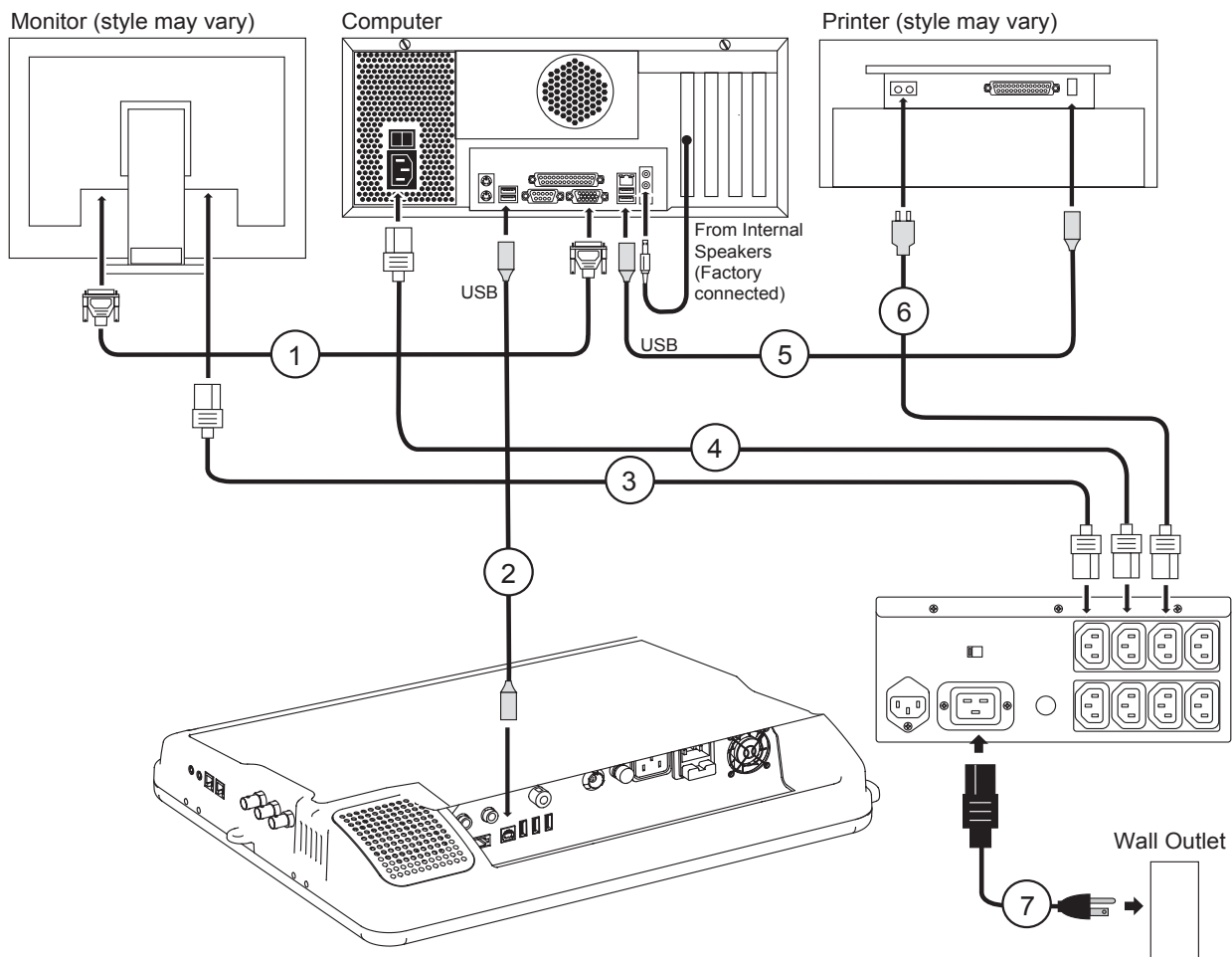
Connector styles shown may vary.

Cable Number	Cable Description	Cable Part Number
1	Video Cable, supplied with monitor	-
2	USB 2.0 Cable, 2m	085-4507xx
3, 4	Power Cord, 2m	085-4357xx
5	USB Cable, 2 m	085-4507xx
6	Power Cable, Printer	085-4266xx
7	Power Cord, USA	085-4247xx

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Endeavor CR Desktop Cabling - Base

LED Goggles   Headphones   Keyboard   Isolation Power Supply

Red   Blue

USB

Red (R)
Blue (L)

Not Used
Not Used

Ext. Trigger In
Ext. Trigger Out 1
Ext. Trigger Out 2

Mini Control Panel

Base

Ground lug

USB - HUB
connection
for additional
device

SP1   SP2

Headboxes

HB-1   HB-2

Stim
Probe

8   9   10

Connector styles shown may vary.

Amplifier - Front   Amplifier - Rear   USB Mouse
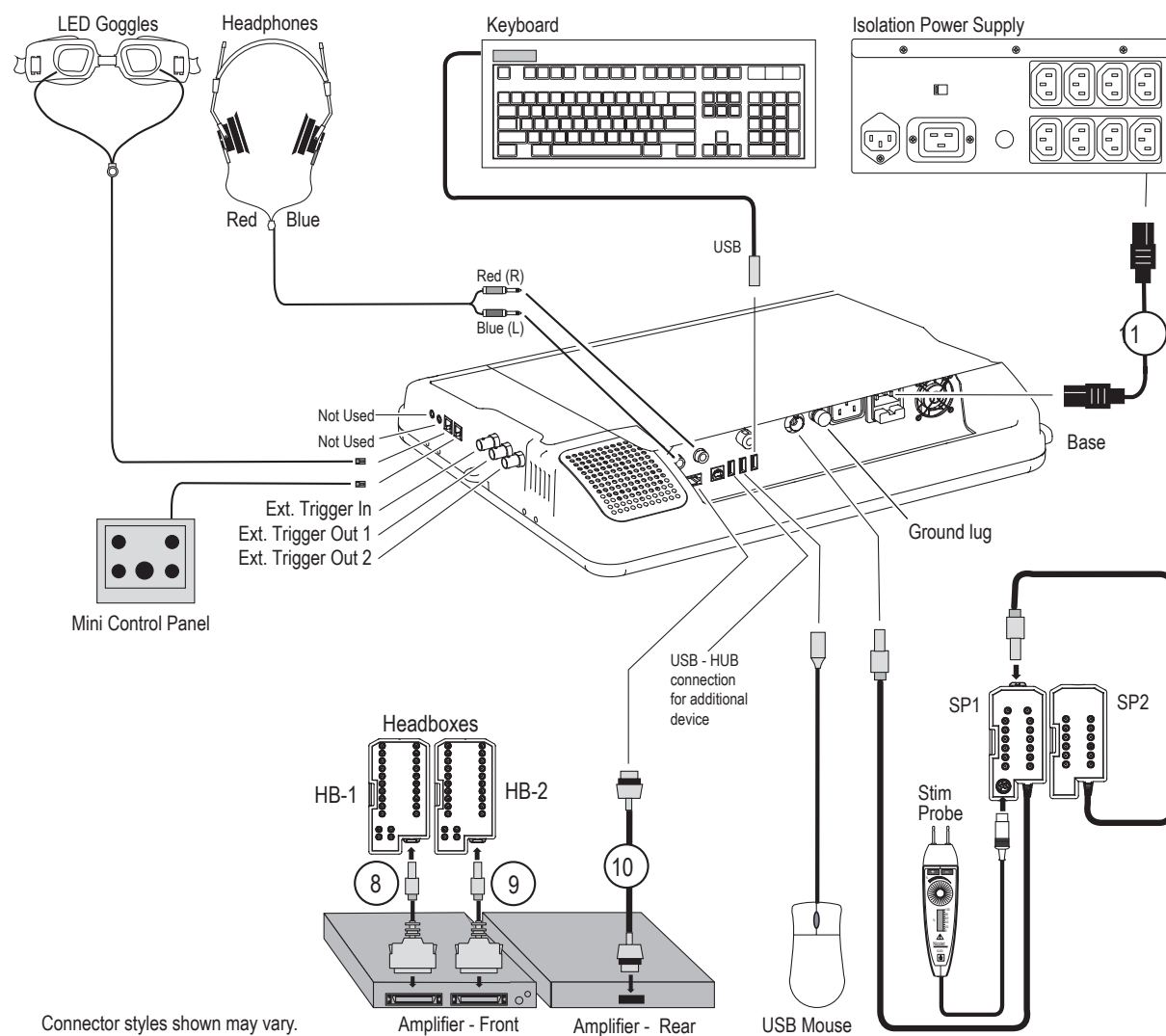
Cable Number	Cable Description	Cable Part Number
8, 9	Headbox Cable, 6 ft. Headbox Cable, 15 ft.	085-4576xx 085-4580xx
10	Amplifier Cable	085-4567xx
11	Power Cable, 1m	085-4081xx

VikingQuest Cabling - Unibody Cart Module Locations

2 Channel or 4 Channel Amplifier

Headphones

Goggles

Probe

(Set on workstation)

Harmonizer

VikingQuest Base Unit

Isolation Power Supply (*)

Ground Strap to Isolation Power Supply (*)

OR

Computer

Ground Strap to Power Strip (**)

Printer (style may vary)

Power Strip (**)

Footswitch
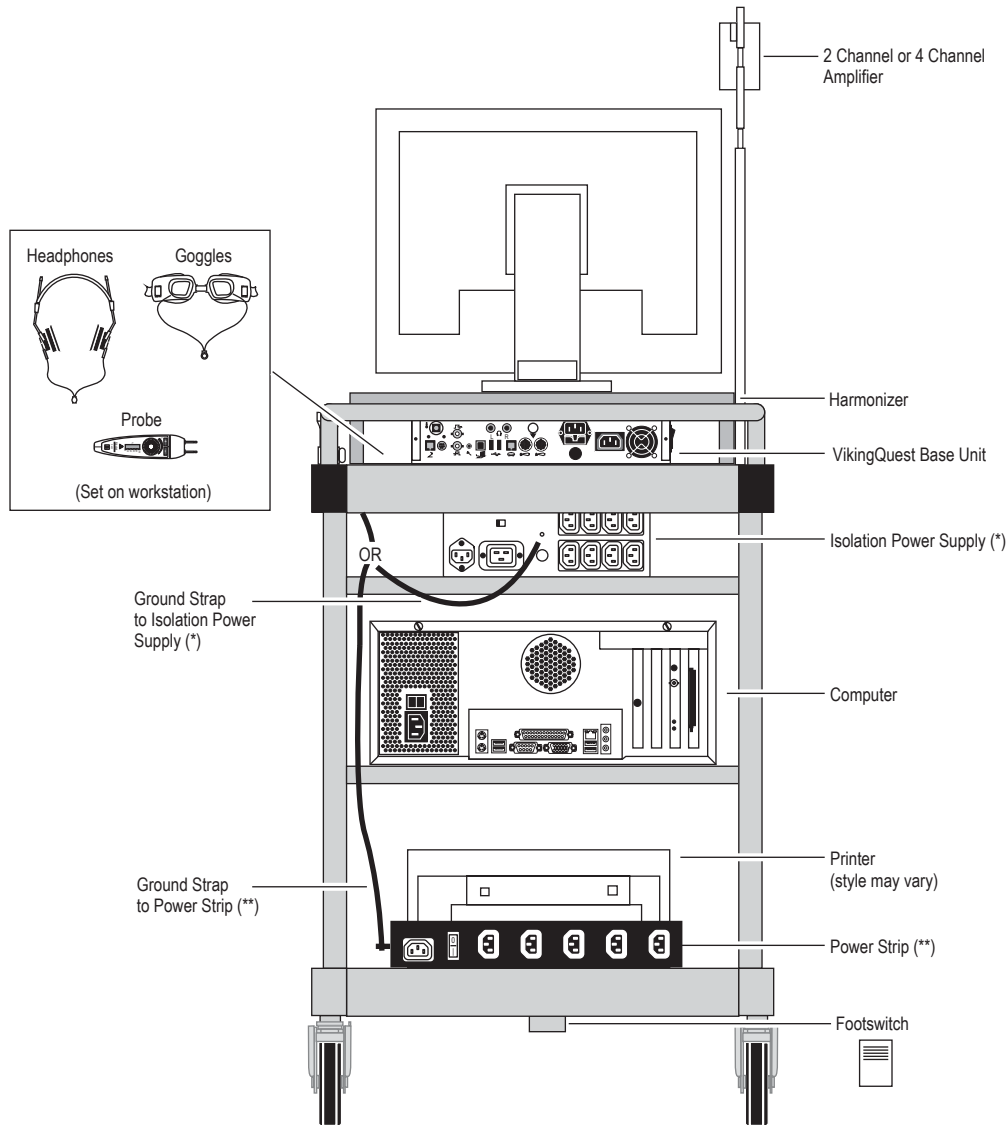
(*) The Isolation Power Supply is used only with Desktop systems.
(**) The Power Strip is used only with Notebook systems.
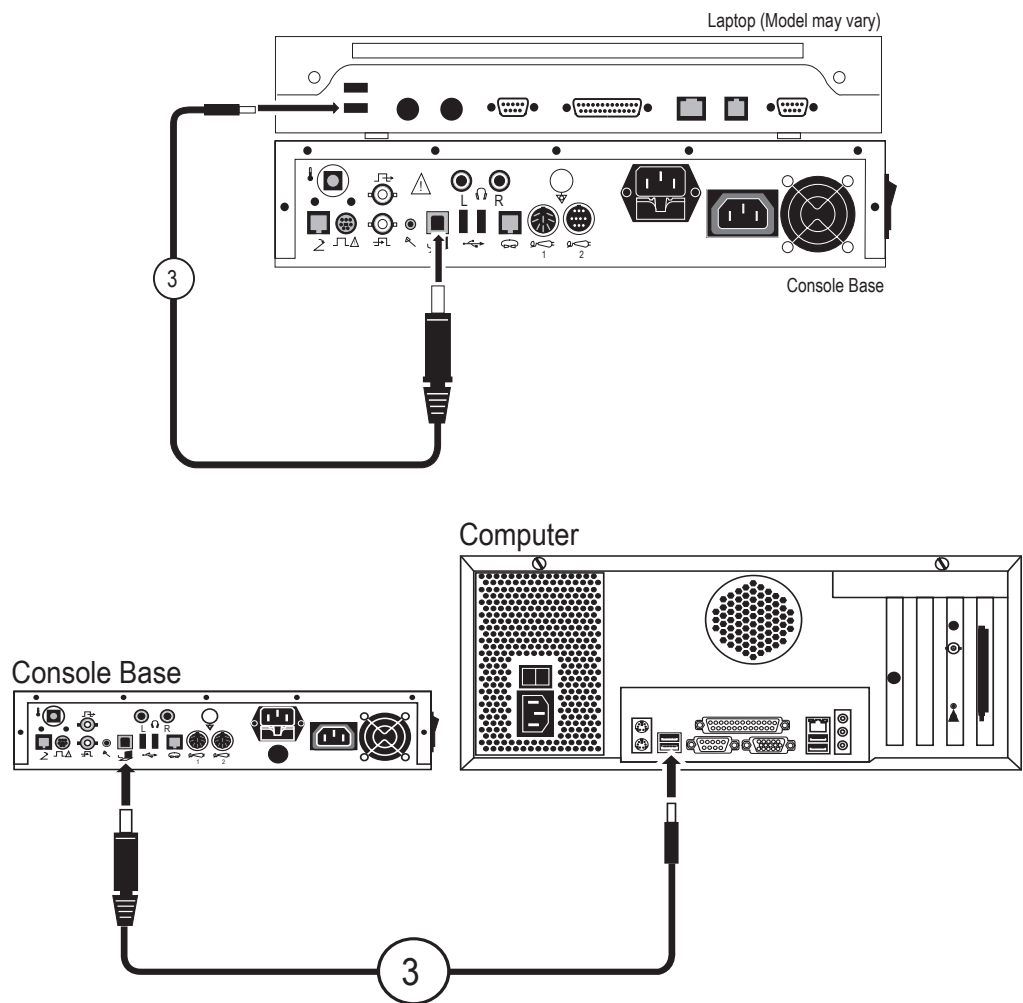
Neurodiagnostic Instruments Service Manual

VikingQuest Cabling - Power
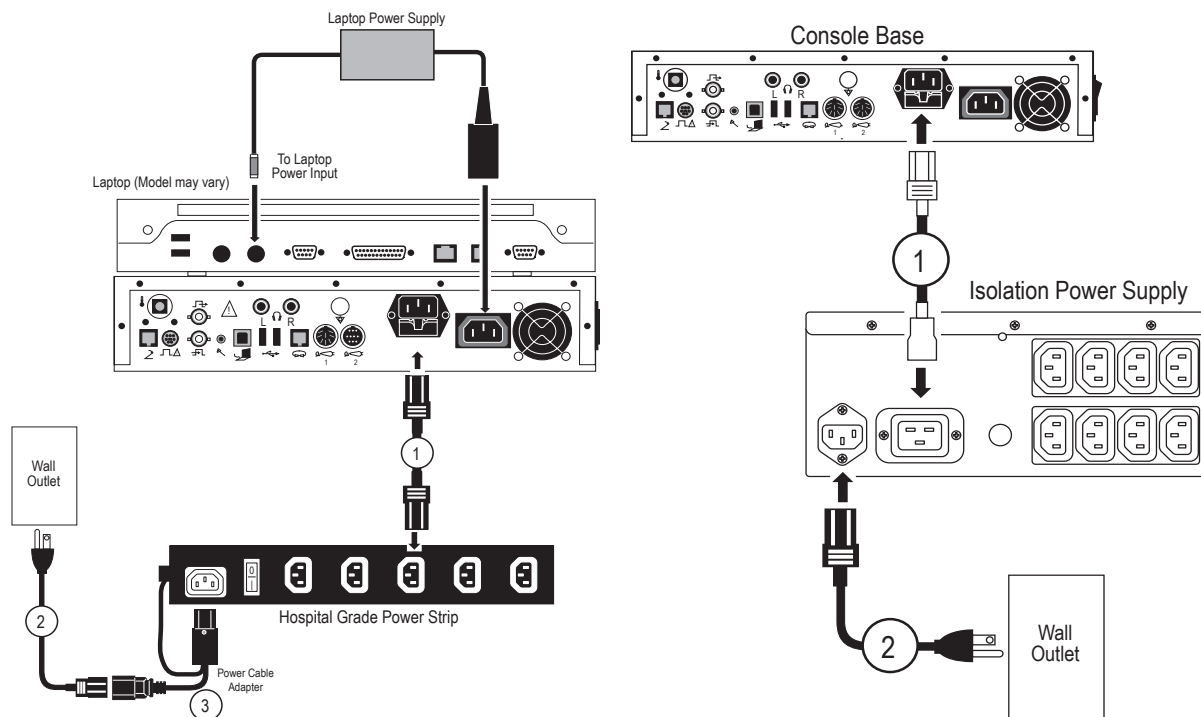
Cable Number	Cable Description	Cable Part Number
1	Power Cord, 10A, 1m.	085-4081xx
2	Power Cord, Dom/Intl 10A, 2m.	085-4357xx
3	Power Cord Adapter w/ Pigtail Gnd.	085-4595xx

VikingQuest Cabling - Computer

Cable Number	Cable Description	Cable Part Number
3	Base/Computer Interface Cable, USB	085-4581xx

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VikingQuest Cabling - Printer
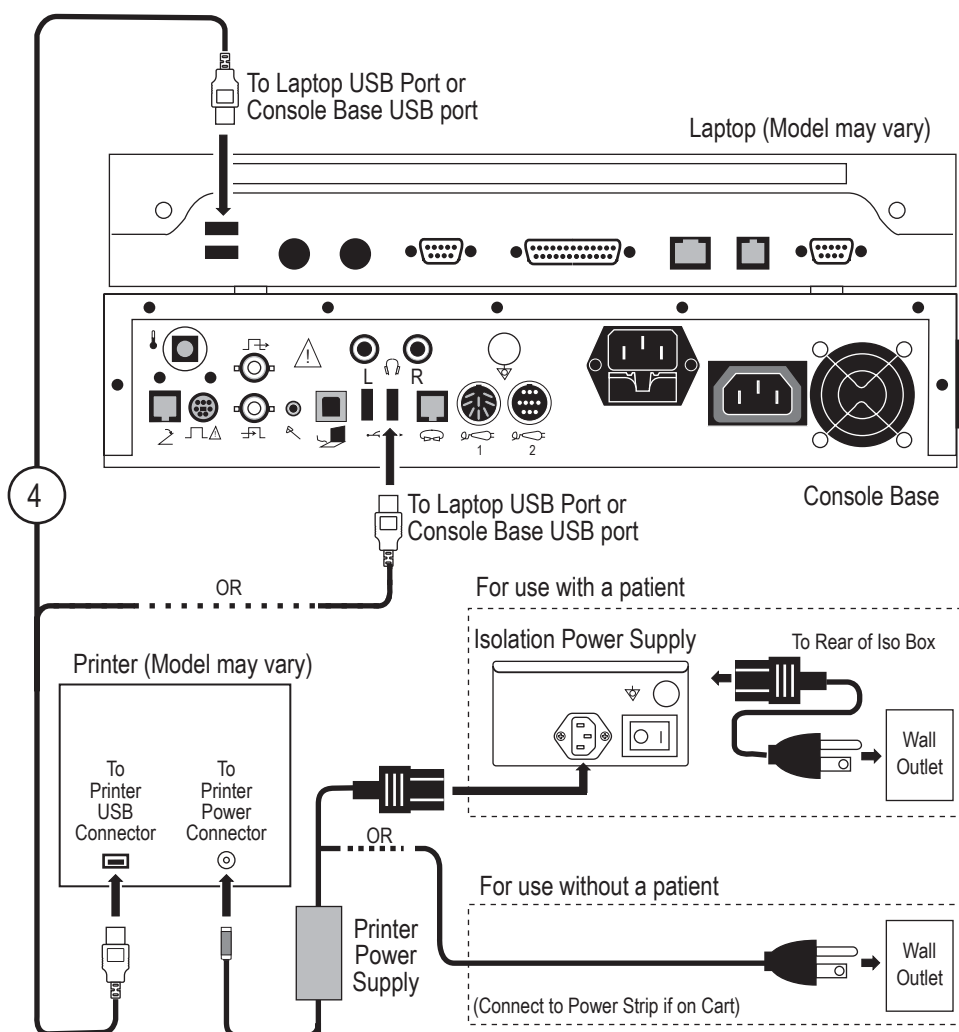
Cable Number	Cable Description	Cable Part Number
4	Printer Cable, USB	085-4507xx

NOTE:

VikingQuest portable systems supplied without a cart meet established leakage current specifications, and do not require an isolation power supply.

VikingQuest portable systems supplied without a cart AND with a USB printer that is located outside of the patent environment (more than 1.5 meters away from an attended patient) meet established leakage current specifications, and do not require an isolation power supply

VikingQuest cart-mounted portable systems and portable systems with a USB printer located within a patient's reach require an Isolation Power Supply.
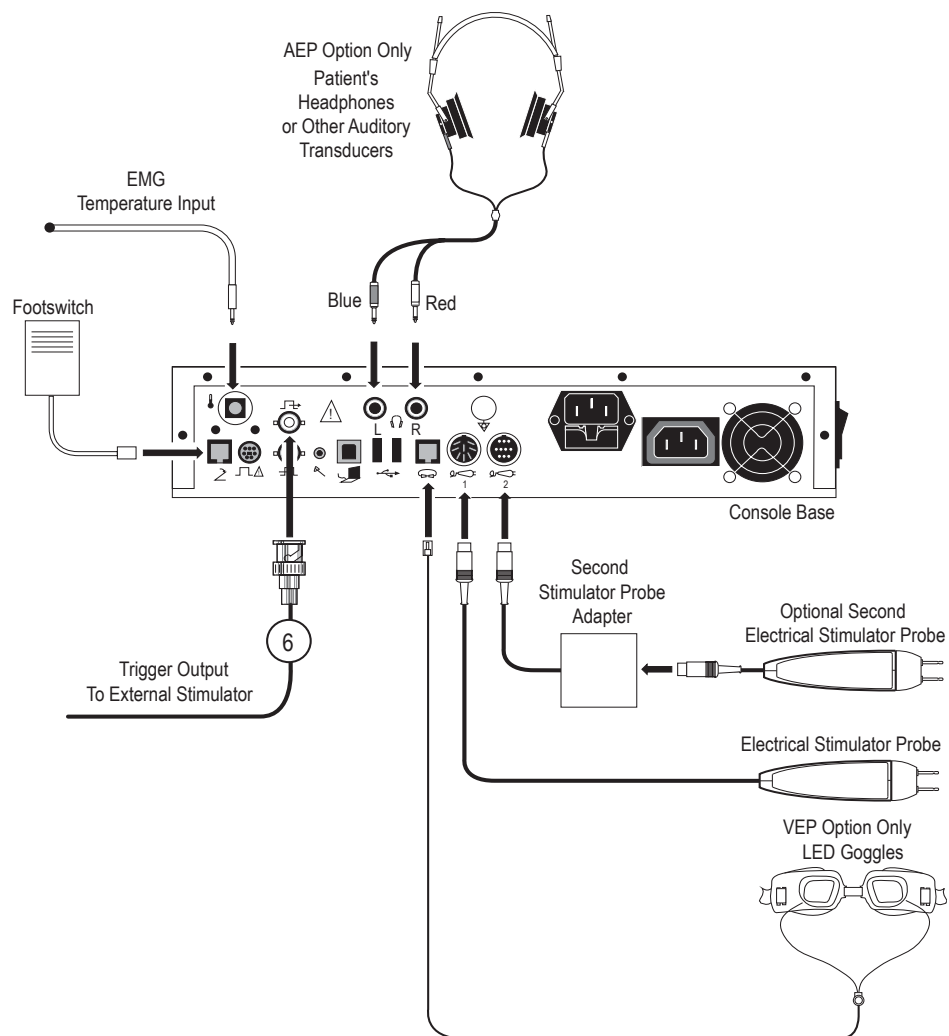
VikingQuest Cabling - Amplifier
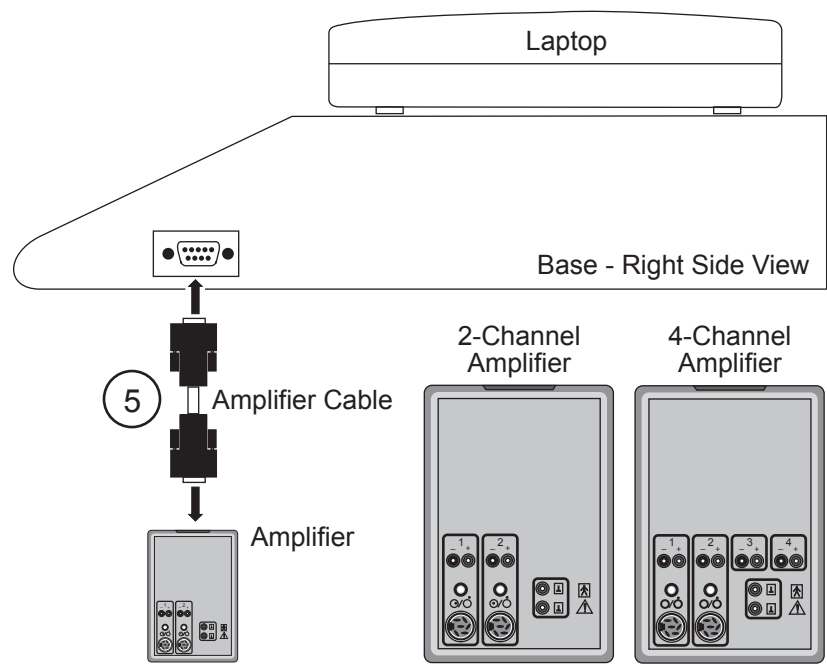
Cable Number	Cable Description	Cable Part Number
5	Amplifier Cable, 2m	085-4582xx

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VikingQuest Cabling - Stimulators

Cable Number	Cable Description	Cable Part Number
6	Trigger Cable, BNCM/BNCM, 15ft.	085-4660xx

VikingSelect Cabling - G2 Cart Module Locations

IES-16
Isolated Electrical Stim

SC-1
Stim Controller

AS-1
Auditory Stim

IES-2
Isolated Electrical Stim
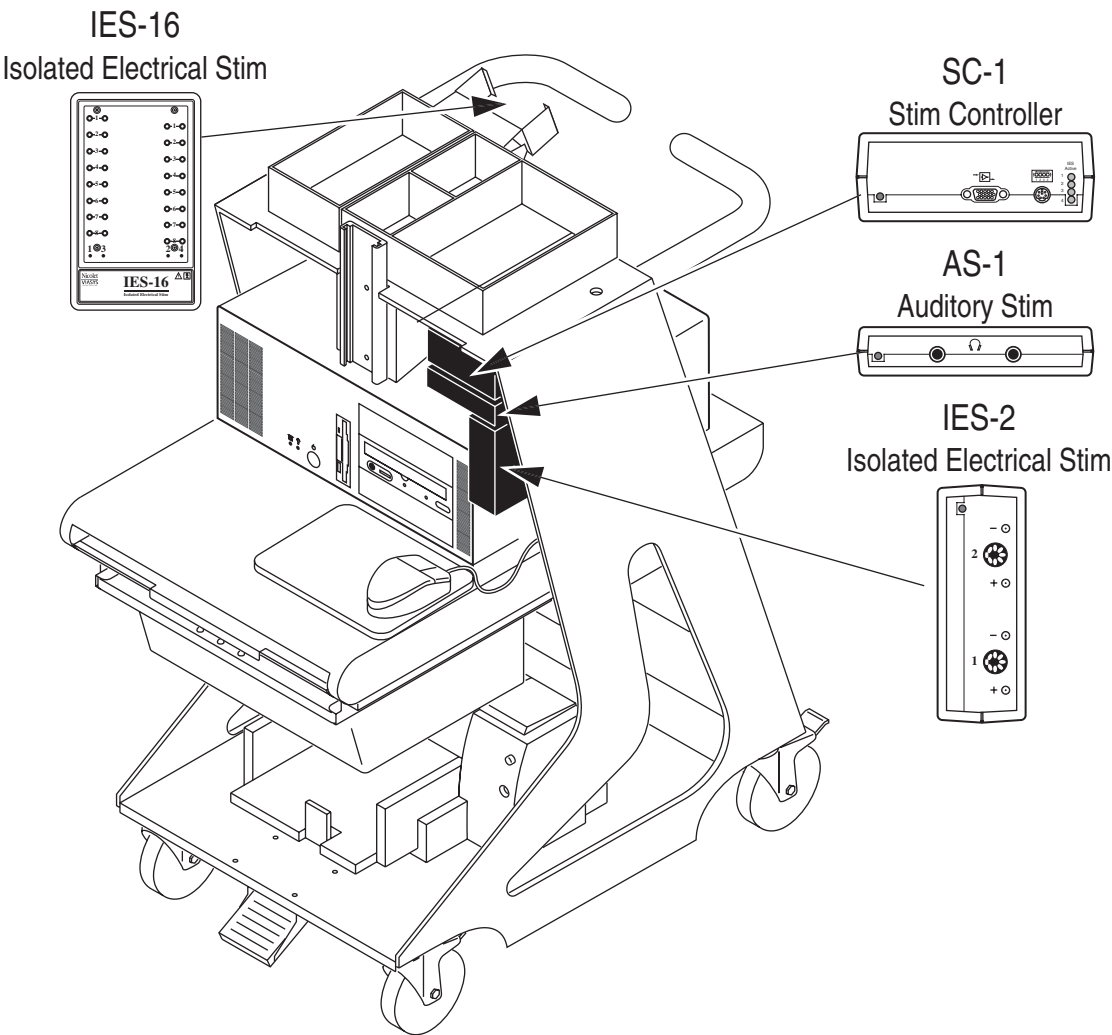
Neurodiagnostic Instruments Service Manual

VikingSelect Cabling - Power
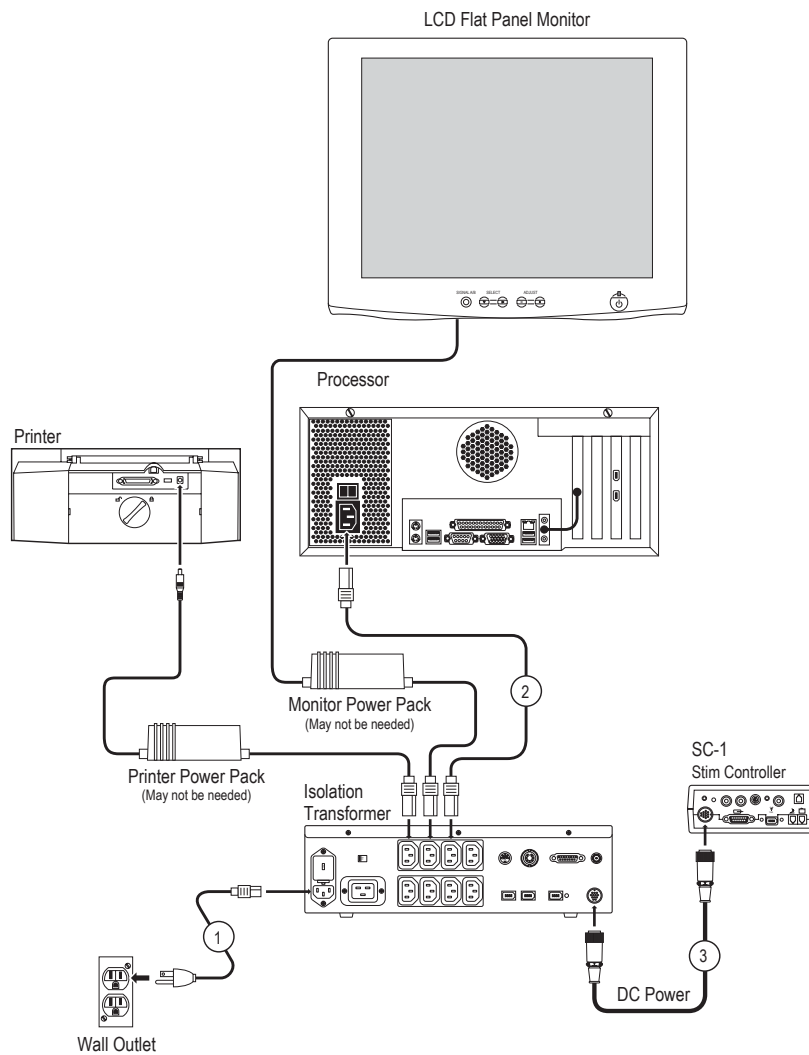
Cable Number	Cable Description	Cable Part Number
1	Power Cord (USA)	085-4247xx
2	Power Cord, 1m	085-4081xx
3	Stim DC Power Cable, 6ft.	085-4509xx

VikingSelect Cabling - Computer Peripherals

LCD Flat Panel Monitor

④

Processor

⑤

Keyboard

Mouse
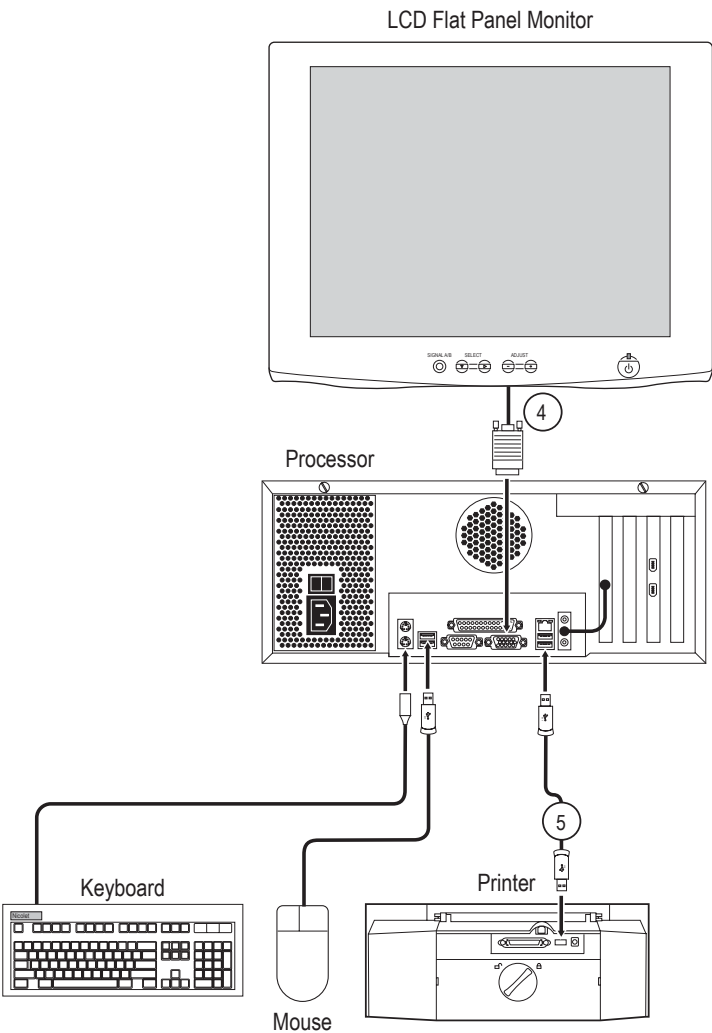
Printer

Cable Number	Cable Description	Cable Part Number
4	Monitor Interface Cable (Supplied w/ monitor)	-
5	Printer Interface Cable, USB	085-4507xx

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VikingSelect Cabling - Amplifiers
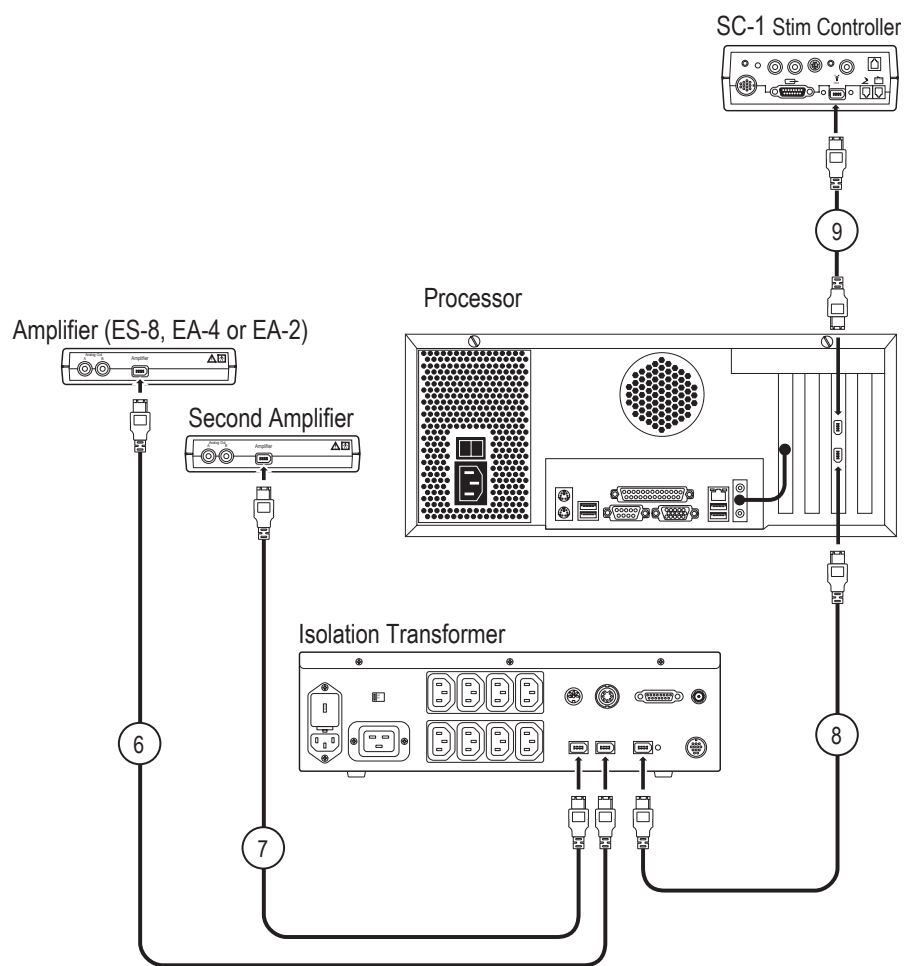
Cable Number	Cable Description	Cable Part Number
6	FireWire Cable, 8 ft.	085-4527xx
7	FireWire Cable, 15 ft.	085-4528xx
8, 9	FireWire Cable, 3 ft.	085-4526xx

VikingSelect Cabling - Stimulators
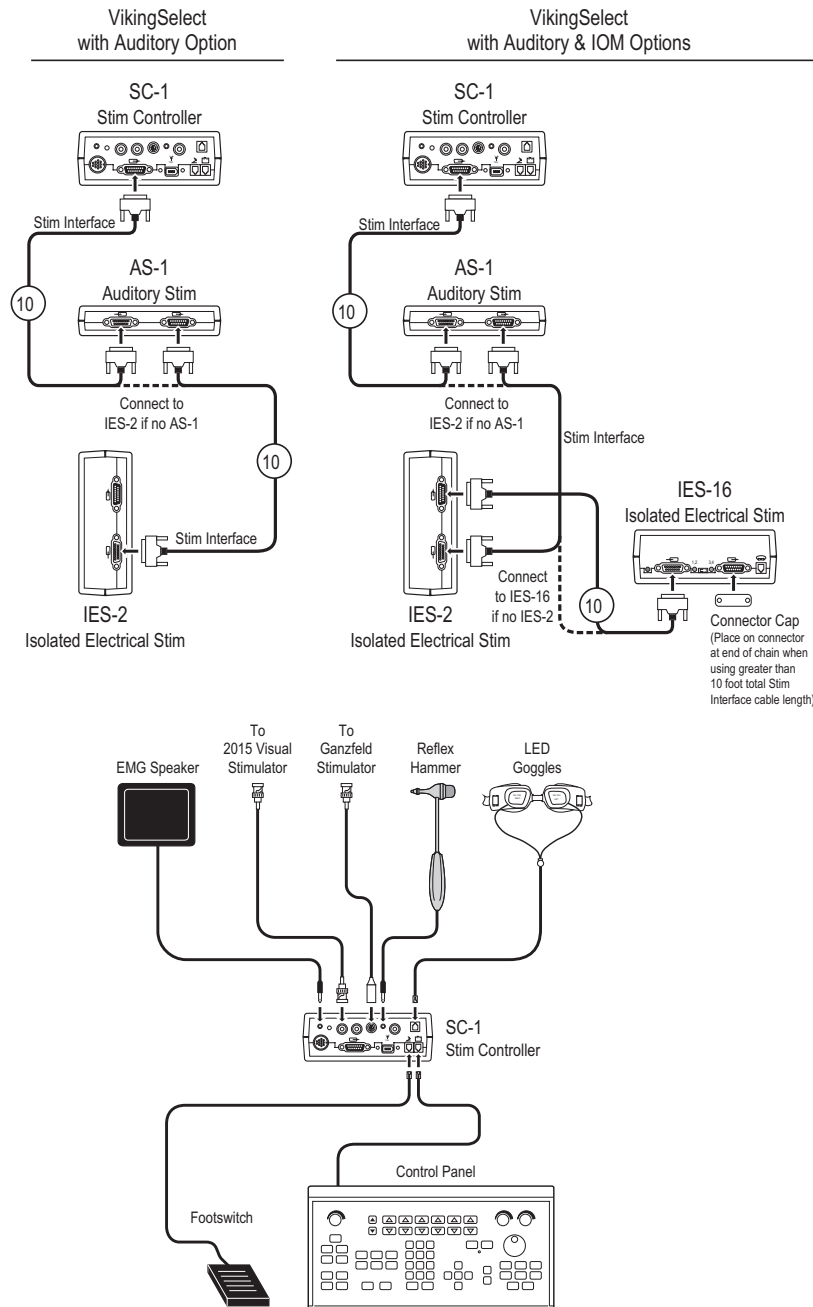
Cable Number	Cable Description	Cable Part Number
10	Stim Interface Cable, 22 in. Stim Interface Cable, 3 ft. Stim Interface Cable, 8 ft.	085-4515xx 085-4512xx 085-4511xx

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System Carts

Unibody Cart

The Unibody Cart is an option for Endeavor CR and VikingQuest systems. This cart has a small footprint, and is suitable for sites where space is at a premium.

The Unibody cart dimensions are:
33in high x 21in wide x 30 in deep
(84cm x 53cm x 76cm).

G2 Cart

The G2 cart is a heavy-duty cart for VikingSelect desktop systems.

The G2 cart dimensions are approximately:
42in high x 21in wide x 35in deep
(135cm x 53cm x 94cm).

A variety of optional shelves, holders and other mounting hardware are associated with these carts. These accessories are shown in
 Chapter 7: Parts List - Cart.

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VIASYS Unibody Cart

VIASYS G2 Cart

Neurodiagnostic Instruments Service Manual

Cart Grounding

The following diagrams show the correct grounding connections for the G2 and UniBody carts.

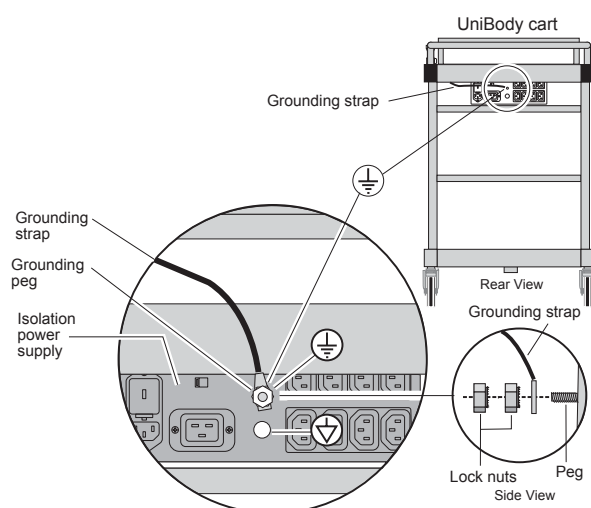### UniBody Cart with 500VA Isolation Power Supply

An isolation power supply must always be used in the following situations:

- ECR and VQ desktop systems used "within the patient environment".

NOTE:

The "patient environment" is defined as a six foot/183cm sphere around the patient, by all United States and International safety standards for medical equipment.

- ECR and VQ portable (laptop) systems where an attached printer is within the patient environment.


UniBody Cart with Power Strip

In a configuration where an isolation power is not required, all system components must be plugged into the medical grade power strip.

The isolation power supply may NOT be required in the following situations>

- ECR and VQ desktop systems where the base system is located outside of the patient environment.

- ECR and VQ portable (laptop) systems where the laptop power supply meets applicable leakage current specifications, and where an attached printer is outside of the patient environment.
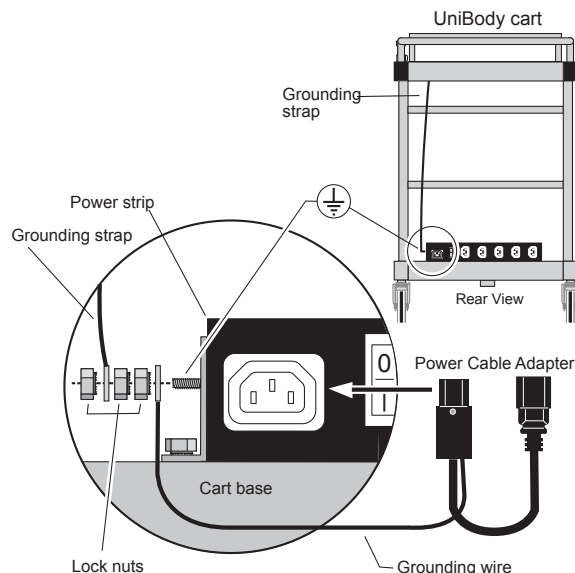
G2 Cart with 800VA Isolation Power Supply

On VikingSelect systems, the 800VA Isolation Power Supply is grounded to the G2 cart by a mounting screw.
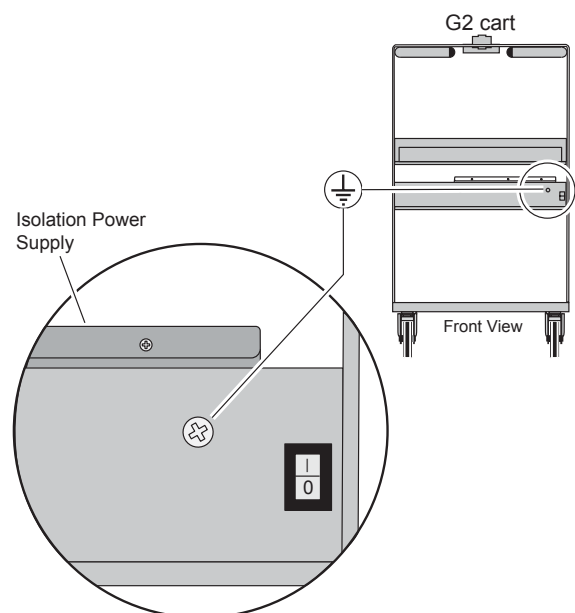
Power Supplies and Power Distribution

The power distribution system for VIASYS Neuro systems may contain the following components:

- Base Unit power supply
- Isolated power supply, 500VA
- Isolated power supply, 800VA
- Computer power supply
- Medical grade power strip (option)

The Isobox must always be used in the following situations:

- A cart-mounted system that will be used "within the patient environment". (The "patient environment" is defined as a six foot / 183cm sphere around the patient in all United States and International safety standards for medical equipment).
- A desktop system that will be used unattended in a patient room.
- A portable system that has an attached printer within the patient environment.

In a configuration where an Isobox is not required, all system components must be connected to a medical grade power outlet.

The Isobox may NOT be required in the following situations:

- Desktop systems where the base system is located outside the "patient environment" (1.5m from patient).
- Portable systems, where the laptop power supply meets applicable leakage current specifications.

Endeavor CR and VikingQuest Base Unit Power Supply

The Endeavor CR and VikingQuest base units contain a Condor GLM65B 65W medical grade power supply with outputs of +5V, +15V and –15V.

Field Adjustments/Maintenance

This power supply has no field adjustable parts. A blown fuse is an indication of catastrophic failure of circuit component(s). This is a replacement item only.

Testing/Troubleshooting

Use a digital voltmeter to measure the voltage values at the output connectors. Refer to the GLM65B Data Sheet, on the following pages for test points.

Condor GLM65B Power Supply

Removal/Replacement

Endeavor CR

For the Endeavor CR, turn the base unit upside-down and remove the six screws fastening the bottom cover to the top cover. Remove the bottom cover to access this power supply.

VikingQuest

For the VikingQuest, Turn the base unit upside-down and remove the nine screws holding the upper case to the lower case.

Turn the base unit right-side-up and remove the five round-head screws on the back side of the base.

On the left side of the base unit, remove the two screws fastening the On-Off switch to the case.

Note: There are five cable connections between the VQ base unit and the Control Panel mounted in the top case. Use care when lifting the top of the case away from the base unit.

Carefully lift the top case and tilt it towards the front of the base unit as you take it off. Either brace the top case in an upright position as not to stress the cable connections, or detach the five cables and lay the top cover aside.

With the top case removed, you can easily check the voltages present at the output connector of the Condor power supply.

Neurodiagnostic Instruments Service Manual

500VA Isolated Power Supply

The 500VA Isolated Power Supply (Iso Box), provides isolated AC voltage for Endeavor CR and VikingQuest desktop systems shipped with the VIASYS Unibody cart.
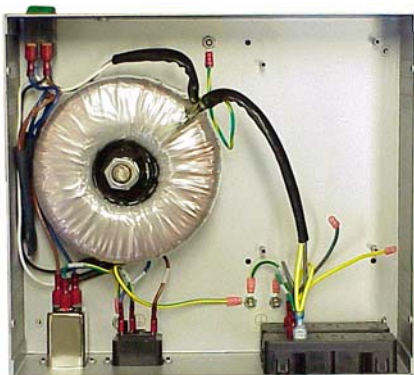
VIASYS 500VA Iso Box

There are two versions of this supply:

- 115VAC In / 115VAC Out
- 230VAC In / 230VAC Out

The input/output voltages for this supply are fixed; each version contains a different toroid transformer.

Field Adjustments/Maintenance

Remove any dust at the ventilation holes, as needed. The isolated power supply has no field adjustable parts.

Testing/Troubleshooting

Use a digital voltmeter to measure the voltage values at the output connectors.

800VA Isolated Power Supply

VikingSelect systems sold with a G2 cart use the 800VA Iso Box shown below.

VIASYS 800VA Iso Box

This supply also provides DC voltages to power optional VIASYS components, such as the EP/EMG amplifier/stimulator modules.

The AC input voltage is selectable between 100, 120, 220 and 240VAC. The voltage selector is on the rear panel of the Iso Box, built into the main On/Off switch assembly.

A hidden switch selects the AC output voltage. The settings are 115 or 230VAC. Normally, there will be no need to change this switch setting, as 120VAC and 220VAC supplies have different part numbers.

An internal circuit board provides three FireWire communication ports.

NOTE: **Notice the difference between this power supply and the older 800VA power supply - this supply has a round connector at the lower right corner of the rear panel to supply voltage to the STim-Out-Of the Box (STOOB) modules for the new VikingSelect.**

Field Adjustments/Maintenance

Remove any dust at the ventilation holes, as needed. The isolated power supply has no field adjustable parts.

Testing/Troubleshooting

Use a digital voltmeter to measure voltage values at the various output connectors. Refer to the 800VA Isolated Power Supply Data Sheet on the following pages for test points.

Non-Isolated Power Strip

For Unibody cart-based systems without an Iso Box, VIASYS provides a medical grade power strip.

Computer Power Supply

The D865GLC Halyron desktop platform uses a 180W ATX power supply with auxiliary power (+5V, +3.3V) and ATX+12V connectors.

ATX Power Supply

Field Adjustments/Maintenance

Periodically verify the power supply fan is operating normally. Remove any dust at the ventilation holes, as needed. The computer power supply has no field adjustable parts.

Testing

1. Check for the following voltages at the power supply main connector on the CPU motherboard.

Measure	Test Point
+3.3V	J1 pins 1, 2, 11 Orange
+5V ±0.50V	J1 pins 4, 6, 19, 20 Red
-5V ± 0.25V	J1 pin 18 White
+12V ± 0.60V	J1 pin 10 Yellow
-12V ±0.60V	J1 pin 12 Blue
GND	J1 pins 3, 5, 7, 13, 15-17 Black

2. Check for the following voltages on the disk drive connectors.

Measure	Test Point
+5V ±0.50V	Red
+12V ±0.60V	Yellow
GND	Black

Removal/Replacement

Removing the power supply from D865LC computer chassis is a tedious process, due to the tight packing of components within the computer chassis, and the location of a reinforcement bar close to the power supply. Before removing the power supply, it is necessary to remove virtually all LRUs, including the computer motherboard and rear panel fan, from the computer chassis.

Neurodiagnostic Instruments Service Manual

Step	Action
1.	Disconnect all cables to the rear of the computer and remove the computer from the cart. Place the computer on a static mat, and use a wrist strap when working inside the computer.
2.	Loosen the two rear panel screws that hold the cover to the chassis. Slide the cover back about one-half inch and lift it up and off the chassis.
3.	Remove the cards in the motherboard expansion slots and set them aside on a static-free surface.
4.	Remove the DVD drive and internal speakers. The mounting cage for these devices is held to the chassis with two screws.
5.	Remove the hard drive(s) from the chassis. Each drive is held in place by a single screw.
6.	Remove the cooling fan from the rear chassis. It is held in place with four screws.
7.	Carefully note the placement and orientation of each connector to the motherboard for easier reinstallation. Disconnect all remaining cables from the motherboard.
8.	Unscrew the motherboard from the chassis (eight screws), carefully remove the motherboard from the chassis, and place it on a static-free non-conductive surface.
9.	Remove the three 6-32 phillips screws that hold the power supply to the chassis.
10.	Rotate the power supply sideways towards the center of the chassis and remove it from the chassis.

Data Sheet: VIASYS 800VA Isolation Power Supply

Functional Description

This 800VA isolation power supply provides power to the VikingSelect computer mounted on the G2 cart.


An input voltage selector provides settings of 110, 120, 220, or 240 VAC. The voltage selector is located behind the panel directly above the line voltage input connector. A separate selector switch allows you to select isolated AC output voltages of either 115 or 230 VAC.

Two internal supplies provide ±15VDC, +12VDC and +5VDC to power system peripherals.

Connector/Switch List

1. AC Input Voltage Selector & Fuse Holder

2. Output Voltage Selector for IEC 60320 connectors (Normally covered by a sticker.)

3. Eight IEC 60320 Connectors

4. Microphone Preamp Power (±15VDC)

5. EEG Amp Power (±15VDC, +5VDC)

6. CPU Auxiliary Power for Nic Boards (± 15VDC)

7. Speaker Power (+12VDC)

8. External Stim Power (±15VDC)

9. 1394 FireWire Port from Computer

10. FireWire Ports for Amplifiers

11. Ground Lug

12. Photic Stim Power (Non-isolated)
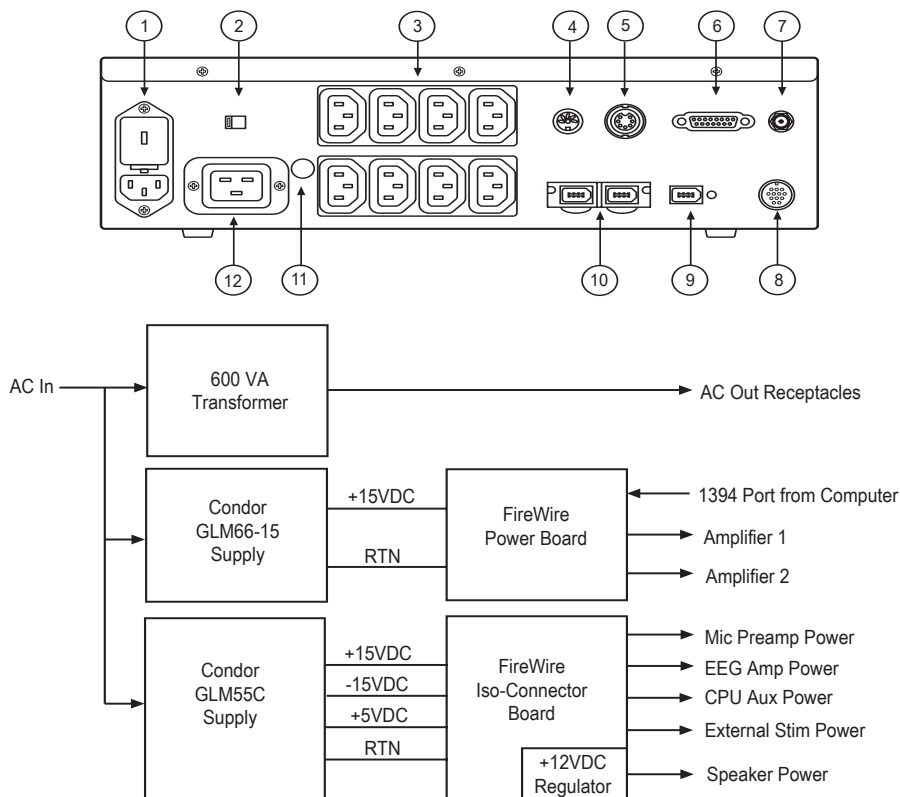
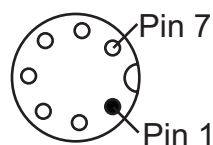*Isolated Power Supply Connections & Block Diagram*

Neurodiagnostic Instruments Service Manual

Connector Pin-Outs

Conn. 4: Microphone Preamp(5-pin DIN)

Pin	Signal	Pin	Signal
1	GND	4	+15VDC
2	-15VDC	5	+15VDC
3	Not Used		

Conn. 5: EEG Amplifier Connector
(7-Pin Circular Female)

Pin	Signal	Pin	Signal
1	Not Used	5	-15V
2	GND	6	Shield
3	+5V	7	+15V
4	GND		

Conn. 6: CPU Auxiliary
(15-Pin D-Connector)

Pin	Signal	Pin	Signal
1	Not Used	9	+15VDC
2	+15VDC	10	GND
3	GND	11	-15VDC
4	-15VDC	12	+15VDC
5	+15VDC	13	GND
6	GND	14	-15VDC
7	-15VDC	15	Not Used
8	Not Used		
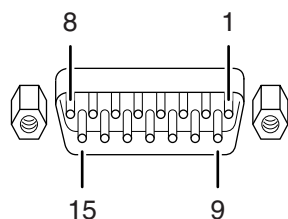
Conn. 7: +12VDC Speaker Power

Conn. 8: External Stimulator Power
(Used by EP/EMG Instruments)

Pin	Signal	Destination
1	+15V	Electrical Stimulator
2	+15V	
3	GND	
4	-15V	
5	-15VS	Auditory Stimulator
6	GND_S	
7	+15VS	
8	+5V	Stim Controller
9	GND	
10	+15VSPK	Speaker
11	GND_SPK	
12	-15VSPK	
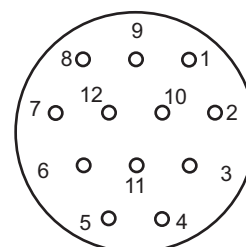
Data Sheet: Condor GLM65B Medical Switching Power Supply

Functional Description

The Condor GLM65B medical grade power supply is used in the Endeavor CR and VikingQuest base units to supply +5V, +15V and -15Vdc to the VIASYS boards and modules.

Condor GLM65B Switching Power Supply

Both the Line and Neutral AC input lines are fused for medical use. A blown fuse is an indication of catastrophic failure of circuit component(s). This is a replacement item only.

Specifications

AC Input Voltage: 85-264Vac, 47-63Hz single phase

Output Power: Total continuous power output is 60W, 75W peak for 60s 10% duty cycle.

Output Voltages (unrestricted convection cooling)

1. +5Vdc, 7A max
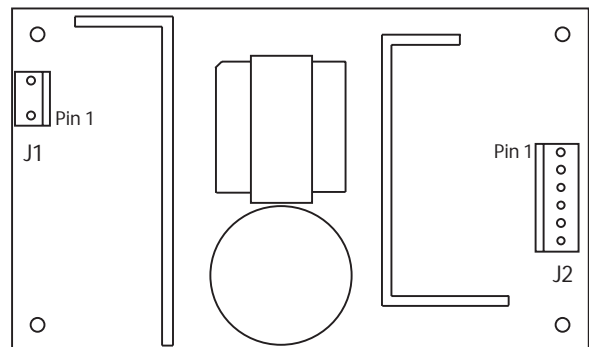2. +15Vdc, 2.5A max
3. -15Vdc, 2A max

Connector Pinouts

J1: AC In

Pin	Signal	Pin	Signal
1	AC Line	2	AC Neutral

J2: DC Out

Pin	Signal	Pin	Signal
1	+15Vdc	4	Common
2	+5Vdc	5	Common
3	+5Vdc	6	-15Vdc

Condor GLM65B Power Supply

Additional Information

http://www.condorpower.com/index.html

Neurodiagnostic Instruments Service Manual

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Computer Platforms

D865GLC Computer Front Panel

VIASYS Neurocare systems have shipped on the following platforms:

- Omni Tech Halyron desktop computer w/ Intel D865GLC motherboard
- Dell Latitude D505 laptop computer

Minimum Requirements

The recommended minimum requirements for a Review Station that reads VIASYS Neurocare data:

- Pentium IV 3.2GHz or better (Hyper-threading technology recommended)
- 512MB RAM Memory or greater
- >80+GB Hard Drive
- Multi-Speed CD Recorder, or DVD+RW drive
- 10/100 Ethernet Network Card
- Graphics Card (Capable of 1280 x 1024 Resolution @ High Color – 16bit)
- Sound Capabilities and speakers
- 17" Monitor or better (Capable of 1280 x 1024 Resolution)
- Color DeskJet Printer (i.e. HP DeskJet) or other Windows XP compatible printer
- Microsoft Windows XP Professional
- Roxio Easy CD Creator (Versions 5.1 or higher) - minimum.

NOTE:

VIASYS Healthcare software applications have only been tested on VIASYS Healthcare supplied hardware. Recommended specifications are listed only as a guide. Positive results cannot be guaranteed.

Hardware Components

- Computer platform
- DIMM modules
- ATX power supply
- CMOS backup battery

Software Components

The BIOS version and the default CMOS settings for the D865GLC computer are documented in the computer data sheet at the end of this section.

VIASYS Neurocare systems use the Windows XP Professional operating system.

Application software includes the appropriate acquisition/review software and NicVue patient database administrator (optional).

Field Adjustments/Maintenance

Routine

Routine maintenance procedures for the computer platform and its internal components include:

1. Regular archiving of data and deleting of archived files from the local hard drives.
2. Regular defragmenting of the hard drives.
3. Periodic inspections for dust accumulation around the fan and other openings.
4. Periodic inspections for loose cable connections.

Long Term

Long term maintenance may require:

1. Updating application software.
2. Changing CMOS settings to accommodate hardware additions or upgrades.
3. Replacing the CMOS backup battery.
4. Re-seating loose expansion cards.
5. Cleaning the floppy drive read/write heads.

Neurodiagnostic Instruments Service Manual

Testing

1. The POST (Power On Self Test) alerts you to problems with the motherboard using either a beep code or displayed error messages.

2. Check the CMOS settings to verify the factory-default settings have not been modified accidently.

Circuit Board Removal/Replacement

Step	Action
1.	Disconnect all cables from the computer then remove it from the cart or console. Place the computer on a static mat.
2.	Loosen the two retaining screws that secure the cover to the rear panel. Pull the cover back and lift it off. Place it out of your way.
3.	The expansion cards are held in place by a plastic retainer. Locate and press in on the tab that secures the retainer to the chassis, then remove the retainer.
4.	Using proper antistatic protection, gently lift the board from its expansion slot.

Replacing the CMOS Battery

Backup power for the CMOS RAM is provided by an on board battery. These batteries typically have a life span of 3-6 years. When the battery starts to weaken, it loses voltage. When the voltage drops below 3 volts, the system settings stored in CMOS RAM (for example, time and date) may be wrong. When this happens, replace the battery. We recommend replacing the battery every two years to prevent problems.

Step	Action
1.	Make sure you have a record of the system configuration settings.
2.	Turn off all peripheral devices connected to the system.
3.	Turn off power to the system.
4.	Remove the system cover.
5.	The button type battery is typically located on the front side of the motherboard, just behind the hard drive.
6.	Replace the worn battery with a direct replacement CR2023 3-volt lithium battery, P/N 089-400600. The (+) side of the battery faces up. There is not provision for an offboard battery.
7.	Power up and press F1 during the boot process to enter the Setup program. Verify or reenter the correct system settings.

Updating the BIOS

Do not update the computer's BIOS version. The OEM version of Windows XP supplied with VIASYS desktop systems is locked to the computer's BIOS. Therefore, updating the BIOS will de-activate the operating system.

Additional Information

The **D865GLC Technical Product Specification** is available from: support.intel.com.

D865GLC Halyron Computer Data Sheet

Overview

The D865GLC Halyron platform contains an Intel motherboard with three PCI slots, and one AGP slot. The motherboard features on-board sound, a LAN connection, and four USB ports. The motherboard contains an Intel(R) Pentium(R) 4, 3.2GHz CPU and 512MB RAM.

Boards & Placement: D865GLC
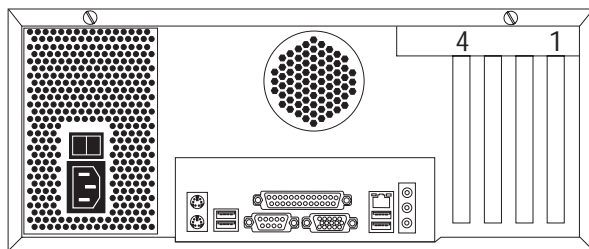
D865GLC Platform Rear Panel

Endeavor CR

Slot #	Board
1	Open (PCI)
2	Open (PCI)
3	Speaker Bay Audio Cable (PCI)
4	Open (AGP)

VikingSelect

Slot #	Board
1	Speaker Bay Audio Cable (PCI)
2	Open (PCI)
3	FireWire Board (PCI)
4	Open AGP)

BIOS Settings

Following are the default manufacturer BIOS settings used for the D865GLC platform. Press F2 during bootup to enter the BIOS Setup utility.

Main Menu

BIOS Version	BF86510A.86A.0056.P14
Processor Type	Intel $^{(R)}$ Pentium $^{(R)}$ 4
Hyper-Threading Technology	Enabled Disabled (VikingSelect only)
Processor Speed	3.2GHz
System Bus Speed	800MHz
System Memory Speed	400MHz
Cache RAM	512KB
Total Memory	512KB
Memory Mode	Dual Channel
Memory Chn A Slot 0	256MB (DDR400)
Memory Chn A Slot 1	Not Installed
Memory Chn B Slot 0	256MB (DDR400)
Memory Chn B Slot 1	Not Installed

Neurodiagnostic Instruments Service Manual

Additional System Information

System Information:	
Manufacturer	Omni Tech Corp
Product Name	OEM-H3246D00
Serial Number	XXXXXXX*
Desktop Board Information:	
Manufacturer	Intel Corporation
Product	D865GLC
Version	AAC32156-XXX*
Serial Number	BTLCXXXXXXXXX*

* System Dependent

Language	English*
System Time	Current Time
System Date	Current Data

Advanced Menu

PCI Configuration	
PCI Slot 1 IRQ Priority	Auto
PCI Slot 2 IRQ Priority	Auto
PCI Slot 3 IRQ Priority	Auto

Boot Configuration	
Plug & Play O/S	No
Numlock	On

Peripheral Configuration	
Serial Port A	Enabled
Base I/O Address	3F8
Interrupt	IRQ4
Parallel Port	Enabled
Mode	EPP
Base I/O Address	378
Interrupt	IRQ7
Audio	Enabled
Onboard LAN	Enabled
ASF Support	Enabled

Drive Configuration	
ATA/IDE Config.	Enhanced
PCI IDE Bus Master	Enabled
Hard Disk Pre-Delay	Disabled
SATA Port-0	ST380013AS*
SATA Port-1	ST3160023AS (DigVid) or Not Detected*
PATA Primary Master	Not Detected
PATA Primary Slave	Not Detected
PATA Sec. Master	Plextor DVDR PX-708A*
PATA Sec. Slave	Not Detected

* Typical values; denote installed drives

Floppy Configuration	
Diskette Controller	Enabled
Floppy A	1.44MB, 3-1/2"
Diskette Write Protect	Disabled

CPC Override	Auto
SDRAM Timing Control	Auto
SDRAM RAS Act. to Pre.	8
SDRAM CAS# Latency	3.0
SDRAM RAS# to CAS# Delay	4
SDRAM RAS# Precharge	4

Event Log Configuration	
Event Log	Space Available
View Event Log	
Clear Event Log	
Event Logging	Enabled
Mark Events As Read	

Video Configuration	
AGP Aperture Size	64MB
Primary Video Adapter	AGP
Frame Buffer Size	16MB

USB Configuration	
High-Speed USB	Enabled
Legacy USB Support	Enabled
USB 2.0 Legacy Support	Hi-Speed

Chipset Configuration **Setup Warning:** **Setting items on this screen to incorrect values may cause your system to malfunction!**	
ISA Enable Bit	Enabled
PCI Latency Timer	32
Burn-In Mode	
Extended Configuration	Default
Chipset Memory Timing Control	
SDRAM Frequency	Auto

Fan Control Configuration	
Fan Control	Enabled
Lowest Fan Speed	Slow

Hardware Monitoring **Note: These measurements are approximate and should not be used for validation purposes.**	
Processor Zone Temperature	55°C/131°F
System Zone 1 Temperature	37°C/98°F
System Zone 2 Temperature	38°C/100°F
Processor Fan Speed	2779 RPM
Rear Fan Speed	0 RPM
Front Fan Speed	2985 RPM
+1.5Vin	1.454V
Vccp	1.482V
+3.3Vin	3.362V
+5Vin	5.184V
+12Vin	12.000V

Neurodiagnostic Instruments Service Manual

Security

Supervisor Password	Not Installed
User Password	Not Installed
Set Supervisor Password	
Set User Password	
Chassis Intrusion	Disabled

Power

ACPI	
ACPI Suspend State	S3 State
Wake on LAN from S5	Power On
After Power Failure	Power On
The options below are not related to ACPI and may be ignored when shutting down using an ACPI OS.	
Wake on PCI PME	Power On

Boot

Silent Boot	Disabled
Intel (R) Rapid BIOS Boot	Enabled
PXE Boot to LAN	Disabled
USB Boot	Disabled
Boot Device Priority	
1st Boot Device	1st Floppy Drive
2nd Boot Device	DVDR
3rd Boot Device	PM-ST380013AS

Additional Information

Complete technical documentation for the D865GLC
motherboard is available from support.intel.com.

Dell Latitude D505 Computer Data Sheet

Overview

The Dell Latitude laptop platform contains an Intel(R) Celeron (R (VikingQuest) or Pentium M (Endeavor CR) 1.4GHz CPU and 512MB RAM.

Dell Latitude D505 Laptop Computer

BIOS Settings

Following are the default manufacturer BIOS settings used for the Dell Latitude D505 platform with BIOS Version A03. Press F2 during bootup to enter the BIOS Setup utility.

Each page in the Setup screen contains a left-hand panel that shows the current settings, and a right-hand panel that shows the instructions/details for the selected menu item.

The bottom of each screen shows the set of navigation keys used for displaying, selecting and modifying the settings.

Page 1 of 7

BIOS Version	A03
Processor Type	Intel (R) Celeron (R) M or Intel (R) Pentium (R) M
Current CPU Speed	1.4GHz
Level 2 Cache	1024KB
System Memory	512MB @ 333MHz

Video Controller	Intel 855GM/855GME
Panel Type	15" XGA
Audio Controller	Sigmatel 9750
Modem Controller	Conexant D480 MDC
Primary Hard Drive	40 GB*
Modular Bay	CD-RW/DVD Combo

* may vary

Page 2 of 7

The order of enabled devices should be as follows, in order to enable booting from a Windows XP repair CD.

Boot Order	
Diskette Drive	Enabled
CD/DVD/CD-RW Drive	Enabled
Internal HDD	Enabled
USB Storage Device	Disabled
Modular Bay HDD	Disabled
Cardbus NIC	Disabled
Onboard NIC	Disabled

Page 3 of 7

Boot Configuration	
Boot POST	Minimal
Boot Speed:	1.40 GHz
Config Warnings	Enabled
Internal Modem	Enabled
LAN Controller	Enabled
PXE BIS Policy	Deny

Neurodiagnostic Instruments Service Manual

Wireless Configuration	
Onboard Bluetooth	Not Installed
MiniPCI Device	Wireless
MiniPCI Status	Enabled
Wireless Control	<Fn+F2>/Application
Wireless	Off

Page 4 of 7

Basic Device Configuration	
Serial Port	COM1
Infrared Data Port	Disabled
Parallel Mode	ECP
Num Lock	Enabled
Enable Keypad	Only by <Fn> Key
External Hot Key	Scroll Lock
USB Emulation	Enabled
Pointing Device	Touch Pad-PS/2 Mouse
Video Expansion	Enabled

Page 5 of 7

This page shows Battery Status information such as battery installed/not installed, % of charge, and whether or not an ac adapter is connected.

Page 6 of 7

Power Management	
Brightness	Battery & AC Settings
Intel SpeedStep(tm)	Enabled
Wakeup On LAN	Disabled
Auto On Mode	Disabled
Auto On Time	00:00
Dock Configuration	
Docking Status	Undocked
Universal Connect	Enabled

Page 7 of 7

System Security	
Primary Password	Disabled
Admin Password	Disabled
Hard-disk drive password(s)	
System Primary	Disabled

Additional Information

Complete technical documentation for the Dell Latitude D505 laptop is available from support.dell.com.

Desktop Peripherals

For desktop systems, the computer peripherals are those input/output devices that connect directly to the motherboard. They are:

- Floppy drive
- Serial ATA hard drives
- CD-writer
- DVD-R/W drive option
- Keyboard
- USB Mouse
- Internal Speakers
- Printers

Floppy Drive

Description

The floppy drive is a standard 3.5-inch 1.44MB drive. It is held to the chassis with two screws, and slides forward, through the computer's front bezel.

Testing

Step	Action
1.	Clean the disk drive using a wet-type cleaning kit.
2.	Place a known good floppy disk in the floppy drive. Verify from the Windows Explorer, the files on the floppy disk.
3.	Check for secure data and power cable connections.
4.	Using a new floppy disk, exercise the floppy drive by running a diagnostic utility.

Removal/Replacement

Step	Action
1.	Remove the computer's top cover.
2.	Remove the two screws that hold the drive to the chassis.
3.	Pull the drive towards the front of the computer and detach the power and data cables. Pull the drive out towards the front of the computer.
4.	Replace the drive and reassemble the system.

Neurodiagnostic Instruments Service Manual

Serial ATA Hard Drive(s)

Serial ATA Hard Drive

Description

The Endeavor CR/VikingQuest desktop systems and VikingSelect system contain a single hard drive, 80GB or larger. Physically, the hard drive mounts into a carrier that is held in place with a single screw.

Removal/Replacement.

Step	Action
1.	Remove the computer's top cover.
2.	Disconnect the power and data/control cables from the drive. Note the orientation of all cables for proper reassembly.
3.	Remove the screw that fastens the drive carrier to the chassis.
4.	Pull up on the plastic tab on the back side of the carrier to rotate the back of the hard drive upwards.
5.	Remove the carrier from the computer. The hard drive is fastened to the carrier with four screws.
6.	Replace the drive and reassemble the system.

CD-RW Drive

Plextor PX-708A DVD Drive

Description

The standard desktop systems contain a CD-RW drive. The Endeavor CR desktop system offers a DVD ±R/RW drive option. The drive connects to the secondary PATA port as Master. The CD R/W drive currently in use is the Sony model 195E. The DVD drive currently in use is the Plextor PX-708A.

Removal/Replacement

Step	Action
1.	Remove the computer's top cover.
2.	Release the computer's front panel by pressing on the three plastic tabs at the top of the cover. Remove the cover.
3.	Disconnect the power and data/control cable from the drive. Note the orientation of all cables for proper reassembly.
4.	Remove the carrier tray
5.	Holding screw located at the top left side of the tray. Slide the tray forward to release it from its holding tabs then lift it upward.
6.	Remove the drive from the carrier.
7.	Verify the jumper setting on the replacement drive (normally Master).
8.	Replace the drive and reassemble the system.
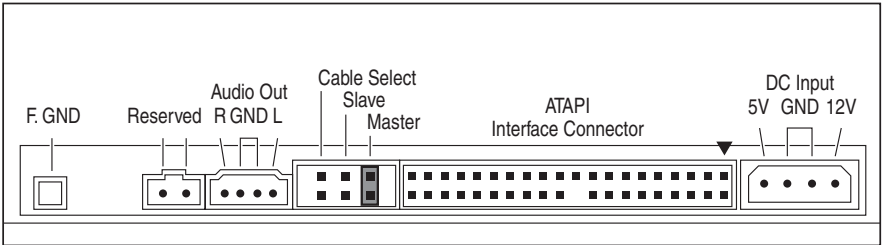
CD-RW Drive Rear Panel Settings
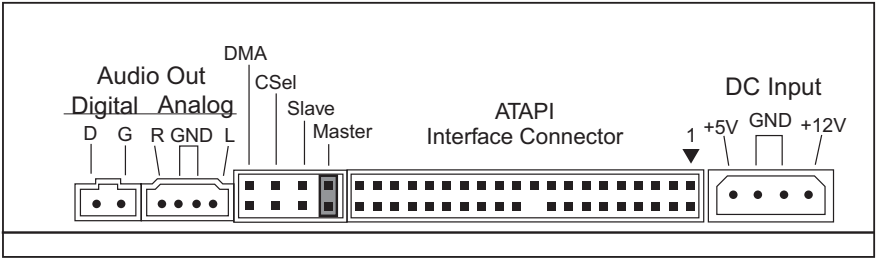
DVD Drive Rear Panel Settings

Neurodiagnostic Instruments Service Manual

Keyboard

Desktop systems use a standard 101-key PS/2 or USB keyboard.

Field Adjustments/Maintenance

The keyboard is a replacement-only item.

Testing

Step	Action
1.	Check the cable connection between the keyboard and the computer.
2.	If you have another keyboard on-hand, power down the system and swap keyboards.

Mouse

Desktop systems use a standard USB optical mouse with wheel.

Field Adjustments/Maintenance

The mouse is a replacement-only item.

Testing

Step	Action
1.	Verify a secure cable connection between the mouse and the computer.
2.	Swap in a different mouse.

LCD Display
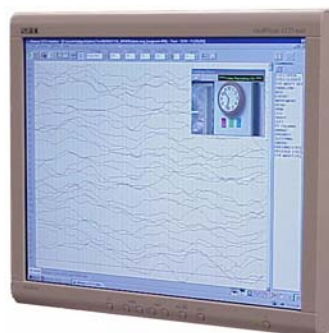
Desktop systems use either a 15" or 18" LCD monitor that connects directly to the computer motherboard. This monitor provides a resolution of 1280x1024 @ 60 Hz refresh rate.

Installation & Setup
A No Touch Adjust feature automatically adjusts the monitor to optimal settings upon initial setup.

Testing
Visually inspect the LCD display for missing pixels.

Further Information
Technical information, FAQs and user/service manuals and a troubleshooting guide are available from the Support link at:
http://www.necmitsubishi.com.

Multimedia Speakers

Desktop systems contain a set of multimedia speakers that fit into a front panel 5-1/4 inch drive slot. The speakers are powered from the computer power supply and driven from the rear panel Audio Line Out connector.

Installation & Setup

The speakers mount in the upper 5-1/4" bay, above the CD or DVD drive.

Testing

Verify that the green indicator on the speaker module is on, and that the speaker cable is plugged into the Line Out (green) connector on the computer's rear panel.

Click on **Start> Settings> Control Panel>Sounds and Audio Devices**. From the *Sounds* tab, highlight a sound from the Program events window, and click on the **Play** icon. Verify you can hear a sound. You may have to adjust the Volume knob on the speaker module (left = maximum volume).

Printers

For Windows XP-based neurodiagnostic products, VIASYS sells and supports selected HP DeskJet and Okidata Laser printers that support the USB interface.

*HP DeskJet Printer
(Models change often)*

OkiData B4200 Laser Printer

HP DeskJet models change frequently, as do the printer specifications.

The OkiData B4200 printer is a sheet-fed black & white laser printer that is typically faster than the HP DeskJet, producing up to 19 pages/minute.

VIASYS-Supplied Printer Drivers

Printer drivers are automatically loaded onto the system with Windows XP, and appear in the *My Computer /Printers* folder. For some newer printers, VIASYS-optimized drivers have been loaded from the Windows 2000/XP Drivers CD, provided by VIASYS Neurocare.

For HP DeskJet printers, the DeskJet Plus driver is set as the default printer driver for VIASYS applications. This setting prints in black and white only, which results in fast, clear printouts. Selecting a different driver for HP DeskJet printers may slow performance.

You may still need to install printer-specific drivers, but continue to select the DeskJet Plus driver as the default printer driver if possible.

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Other Printer Drivers

VIASYS DOES NOT recommend loading the printer drivers and applications that accompany the printer. These drivers have not been tested with the system and may not function correctly with VIASYS applications. Once loaded, they can be difficult to remove and may void your warranty.

If you are installing a different model of replacement printer, Windows XP may "require" loading the printer drivers supplied with that printer. If possible, VIASYS recommends that you select a Custom Installation to avoid installing as many manufacturer-supplied "bonus" options and applications as possible.

If you experience problems with the printer or loading printer drivers, please contact your local VIASYS Healthcare technical support representative.

Field Adjustments/Maintenance

Replace the ink or toner cartridges as necessary, replenish the stock of paper.

Testing

Testing and troubleshooting procedures may differ, depending on the printer model. Consult your printer user's guide for specific information.

Additional Information

For HP DeskJet printer information, log onto www.hp.com and select the *Support and Drivers* link. Type in the model number of your printer and follow the appropriate links for the information you require. Refer to your Okidata User's Guide for maintenance and troubleshooting information.

For OkiData printers, log onto www.okidata.com.

Network

This section discusses the hardware and software components that make up a typical VIASYS network.

A VIASYS network consists of two or more systems connected to a hub or switch via a category 5 UTP cable. A network stops being just a VIASYS network when there is an additional connection to a hospital backbone or Information System.

The network "functional unit" consists of hardware and software components:

*   Network Interface (often built onto the motherboard)
*   Ethernet Category 5 cable (UTP)
*   Ethernet 100 Mbit Hub
*   Microsoft Networking Services and Protocols

NOTE:

Refer to the Appendix for system component part numbers.

Hardware Components

Network Interface
On D865GLC platforms, the network interface is built onto the computer motherboard.

Cables and Hubs
The cabling topology generally used for VIASYS systems is ethernet UTP. The maximum cable length for this topology is 100 Meters (300 ft.) The other pertinent rules are:

*   The speed of the network will be determined by the slowest component.

*   There is a maximum of 205M between the farthest communicating systems, using a hub.

Hardware Setup

Step	Action
1.	Plug one end of the network cable into the system's network card and the other end into a numbered port on the hub. Some hubs/switches have an Uplink port; systems should not be plugged into this port.
2.	With the systems and the hub powered on, verify the Link indicator lights on the hub and network cards are illuminated
3.	If plugging into a wall jack instead of a hub, make sure the port is active. You may need to involve the IS department for this step.

Software Components
VIASYS XP-based systems require no additional software components to communicate over a network. The Windows XP operating system takes care of all network communication. Refer to Chapter 5: System Procedures for detailed information on setting up a VIASYS network.

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TCP/IP Utilities

The TCP/IP protocol provides a set of utilities to help diagnose and isolate network problems.

IPconfig

This command verifies the local machine's TCP/IP configuration parameters:

Step	Action
1.	Click on **Start >All Programs >Accessories >Command Prompt**. The *Command Prompt* window opens.
2.	Type **ipconfig /all** and press **<Enter>**. The system reports the local computer's IP address, subnet mask, default gateway, a description of the network adapter, the physical (MAC) address, and the status of network services such as DNS and DHCP, as they pertain to the network adapter.

NOTE: **To record the IP settings to a text file on floppy, use the command:**
`ipconfig /all >a:\ipinfo.txt`

Ping

The Ping command sends a small signal to a known TCP/IP address to test whether a particular TCP/IP host is available and functional. If the remote computer is available on the network it will send a response back to the local computer with the following message repeated four times: Reply from *IP_address....*

Step	Action
1.	Click on **Start/Programs/ Command Prompt**. The Command Prompt window opens.
2.	Type **ping *IP_address*** and press **<Enter>**. (where *IP_address* is the address of a remote computer.) A successful reply indicates that you can talk to the remote computer. If the ping is not successful, try the following steps.
3.	Type **ping 127.0.0.1** (loop back address) and press **<Enter>**. A successful reply indicates that TCP/IP is installed and loaded correctly on the local computer.
4.	Ping the IP address of your computer to verify it was added correctly and to check for possible duplicate IP addresses.
5.	Ping the IP addresses for the other stations on your network to verify they are present.

Stimulus Pulse Generators

Neurodiagnostic systems require a Stimulus Pulse Generator block to trigger the auditory, visual and electrical stimulators, and to coordinate stimulus delivery with data collection and processing.

In VIASYS systems, the stimulus generator block generally shares space on a circuit board with other VIASYS-unique circuits. These are most often input/output related circuits that include trigger in/out, the control panel interface, foot switch interface, LED goggles interface, ganzfeld interface and reflex hammer interface.

Endeavor CR and VikingQuest Base Units

The stimulus pulse generator block and I/O interface for the Endeavor CR and the Viking Quest are integrated into the base unit's main circuit board.

Viking Select SC-1 Stimulus Controller

The stimulus generator block and I/O interface circuits for the VikingSelect reside in the SC-1 Stimulus Controller module. The SC-1 receives instructions from the host computer via a FireWire interface and communicates with the AS-1, IES-2 and IES-16

stimulator modules via AES serial (Audio Engineering Society standard serial transmission format).

The SC-1 performs the same functions that were performed by the D-Stim I/O board in the original VikingSelect and Endeavor.

The input/output connections on the SC-1 are:

- EMG speaker
- Trigger 1 out
- Trigger 2 out
- Ganzfeld
- Reflex Hammer
- Trigger in
- LED Goggles
- Power
- AES communication
- FireWire
- Footswitch
- Control Panel
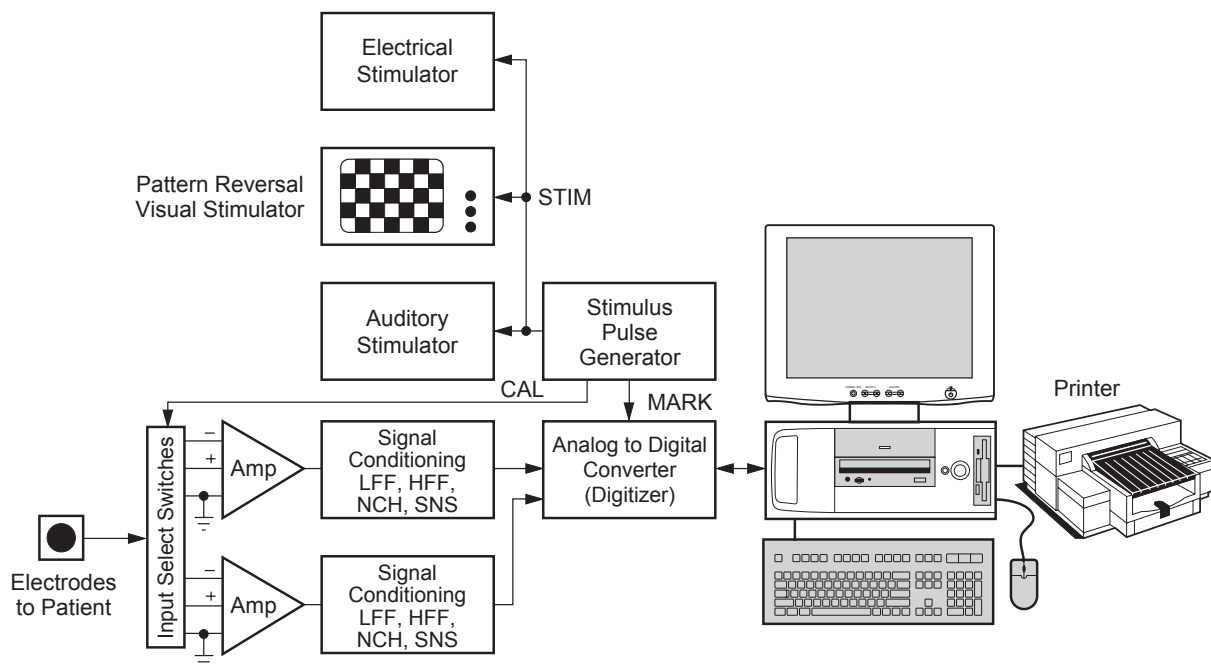
Generic Evoked Potential Instrument

Neurodiagnostic Instruments Service Manual

Field Adjustments/Maintenance

The circuit boards that contain the stimulus pulse generator block for the Endeavor CR, VikingQuest and VikingSelect have no adjustable or replaceable parts.

Testing

Run the USB/FireWire diagnostics as described in Chapter 5: System Procedures. For customers, the Least Replaceable Units are:

- Endeavor CR Base Unit
- VikingQuest Base Unit
- VikingSelect SC-1 Stimulus Controller.

Visual Stimulators

Visual Stimulators for VIASYS neurodiagnostic systems include:

- 2015 Pattern Reversal (most used)
- LED Goggles
- Photic Strobe

2015 Pattern Reversal

The 2015 Pattern Reversal Visual Stimulator provides pattern reversal or pattern flash stimuli for recording visual evoked potentials and electroretinograms. This stimulator is used in clinical environments. The 2015 consists of a base unit and accompanying CRT monitor. The 2015 base unit is a self-contained unit and is a LRU.
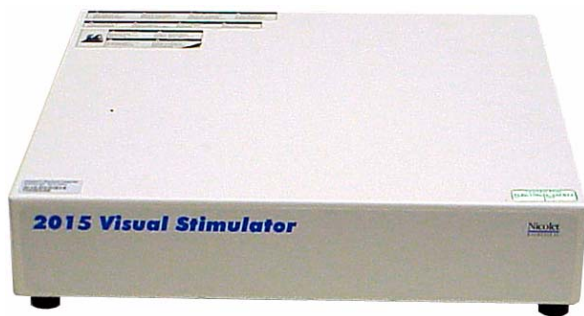
The 2015 Pattern Reversal Visual Stimulator can operate using external or internal trigger modes, and connects to the neurodiagnostic system's Trigger 1 Out connector.

NOTE:

Refer to the 2015 Service Manual for detailed service information.

LED Goggles

The LED Goggles provide a red flashing stimulus, which can elicit a visual evoked response through closed eyelids. LED goggles are primarily used in the O.R. or ICU with an anesthetized or otherwise unconscious patien.

The LED goggles are driven directly from the Endeavor CR and VikingQuest Base Unit. On the VikingSelect, the goggles plug into the SC-1 Stimulus Controller module.

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Auditory Stimulators

The Auditory Stimulator Least Replaceable Units are:

- Endeavor CR Base Unit
- VikingQuest Base Unit
- VikingSelect SC-1 Stimulus Controller and AU-1 Auditory Stimulator
- Transducers
  - Unshielded TDH-39
  - Shielded TDH-39
  - TIP 300 Tubal Inserts
  - Bone Vibrator

Base Units

For the Endeavor CR and the VikingQuest, an auditory stimulus board within the Base Unit generates the clicks, tones, and noise masking levels for the Endeavor CR. The auditory stimulus generator requires no adjustment or maintenance.

The Base Unit is an LRU, and must be replaced if you determine that a fault lies within this unit.

VikingSelect

On the VikingSelect, the auditory stimulus is generated by a digital signal processor on the SC-1 Stimulus Controller. The digital form of the auditory stimulus signal is routed to the AU-1 Auditory Stimulator module where it is converted to analog form, attenuated, and delivered to the transducer.

Auditory Transducers

The auditory transducers convert the electrical signal from the auditory stimulator to sound. VIASYS provides a variety of transducers to meet specific customer needs.

The transducers are LRUs and have no replaceable parts. They require no adjustment, but should be kept clean to extend their useful lifetimes.

TDH-39 Headphones

The TDH-39 are aural headphones used to present an auditory stimulus to the patient.

Shielded   *Unshielded*

TIP 300 Tubal Inserts

The TIP 300 Tubal Inserts are an alternative to the headphones. The transducers for the tubal inserts are hung from the neck, away from the recording electrodes. Sound is delivered to each ear through a plastic tube, to an insert placed in the ear canal. The distance between the transducers and recording electrodes eliminates the stimulus artifact inherent with headphone transducers.

Bone Vibrator

The Bone Vibrator delivers an auditory stimulus through the skull, bypassing the eardrum to stimulate the cochlea.

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Troubleshooting

Problems with the Auditory Stimulator can be isolated by running the USB or FireWire diagnostics provided with the system, or by swapping transducer leads at the Auditory Output connectors.

The symptoms of a failed auditory stimulator could be:

• no sound output at all
• sound only in one ear
• wrong sound intensity.

If the headphones are known to be good, the problem is within the Base Unit (Endeavor CR / VikingQuest), or within the SC-1 or AU-1 modules (VikingSelect).

Electrical Stimulators

The electrical stimulators for the Endeavor CR, VikingQuest, and VikingSelect are physically different, and will be discussed separately.

Endeavor CR Electrical Stimulator System

The electrical stimulator functional units are:

- Endeavor CR Base Unit
- Stimulus Pod 1
- Stimulus Pod 2 (option)
- MC-4 Mini Control Panel (option)
- Electrical Stimulator Probe (option)

Stimulus Generator

The circuits responsible for producing the isolated electrical stimulus pulse reside on the Endeavor CR base board, within the Base Unit. The electrical stimulus circuit is capable of delivering a constant voltage level of 1 to 400V, or a constant current level of 0.1 to 100mA, up to a maximum pulse duration of 1msec.

Stimulus Pods

The electrical stimulator pods distribute the stimulus pulses from the single electrical stimulus source to a selected number of destination locations or output pairs. In this way, the single source can function as one, two three or four stimulators.

Stimulus Pod 1 contains six standard output pairs plus a single "low-level" output pair and a connector for a S-203 Stimulus Probe. The "low-level" pair on Pod 1 has a special circuit that limits the output current to a value of 18 milliamps in hardware. Software further limits this

output to 5 milliamps in a constant current mode in the user interface.

Stimulus Pod 1   *Stimulus Pod 2*

Stimulus Pod 2 provides six additional standard output pairs.

MC-4 Mini Control Panel

The MC-4 Control Panel controls the Stimulus Intensity for up to four switched stimuli, that are sent to the Stimulus Pods.

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Stimulus Probe

Stimulus Pod 1 will accept one stimulus probe. Either the
S-402 or S-403 Stimulus Probe may be used, however the system supports only the Console mode of operation. The probe is controlled through the MC-4 Control Panel or slide controls in software.

SM-402 Stimulus Probe

SM403 Stimulus Probe

Testing

The USBDiagnostics for the Endeavor CR are the primary tool for testing and troubleshooting the electrical stimulator functional units. Refer to Chapter 6: Troubleshooting for detailed instructions on using the diagnostics.

VikingQuest Electrical Stimulator System

The electrical stimulator functional units are:

- VikingQuest Base Unit/Control Panel
- Electrical Stimulator Probe
- Stimulator 2 Module

Stimulus Generator/Control Panel

The circuits responsible for producing the isolated electrical stimulus pulse reside on the VikingQuest base board, within the Base Unit. The electrical stimulus circuit is capable of delivering a constant voltage level of 1 to 400V, or a constant current level of .1 to 100mA, up to a maximum pulse duration of 1msec.

The VikingQuest Base Unit provides one channel of isolated electrical stimulus directly to a stimulus probe, and provides a connector for an optional second channel.

Elec. Stim 2 Connector   *Elec. Stim 1 Out*

VQ Base Rear Panel

The potentiometer on the left side of the VikingQuest Control Panel controls the EMG sound level. The right-hand potentiometer controls the electrical stim level in Console mode. If a protocol uses two electrical stimulators, stimulus 1 will be controlled remotely, and stimulus 2 can be controlled from the base.

EMG Sound Level   *Electrical Stim Level*

VikingQuest Control Panel

EStim 2 Option

The new VikingQuest features a second electrical stimulator option. The EStim 2 connector on the VikingQuest rear panel delivers +5V, +/-15V, a stimulus pulse and serial communication lines to the EStim 2 module. The module contains isolation and delivery circuits, and is functionally equivalent to the IES module used for the Viking IV system. The EStim 2 module provides a connector for a stimulus probe and a bar electrode.

EStim 2 Module

Stimulus Probes

The VikingQuest will accept either the S-402 or S-403 Stimulus Probe. The S-402 functions only in the Console mode of operation.

SM-402 Stimulus Probe

SM403 Stimulus Probe

Testing

The USBDiagnostics for the VikingQuest are the primary tool for testing and troubleshooting the electrical stimulator functional units. Refer to Chapter 6: Troubleshooting for detailed instructions on using the diagnostics.

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VikingSelect Electrical Stimulator System

The electrical stimulator functional units are:

- SC-1 Stimulus Controller
- VikingSelect Control Panel
- IES-2 Electrical Stimulator Module
- IES-16 Electrical Stimulator Module
- Electrical Stimulator Probes
- Connecting Cables

SC-1 Stimulus Controller

The SC-1 Stimulus Controller receives instructions from the host computer via a FireWire interface and communicates with the electrical stimulators over an AES serial link.

VikingSelect Control Panel

The VikingSelect Control Panel controls the Stimulus Intensity in the Console mode of operation.

IES-2 Clinical Electrical Stimulator

The IES-2 is a single module with two independent channels of isolated electrical stimulation. Each channel has a seven pin din connector for a S403 stim probe and a pair of DIN 42 802 electrode outputs.

The IES-2 Clinical Electrical Stimulators receives parameter instructions and a stimulus pulse from the SC-1 Stimulus Controller. This unit produces the high voltage, isolated electrical stimulus pulses that are delivered to the patient Each channel is capable of delivering a constant voltage level of 1 to 400V, or a constant current level of .1 to 100mA, up to a maximum pulse duration of 1msec.

IES-16 O.R. Electrical Stimulator

The IES-16 is a single module with two independent channels of isolated electrical stimulation. Each independent channel has eight DIN 42 802 electrode pair outputs. Only one electrode pair, from each channel, is active at a time. The system's software will control which output pair is active. There are no connectors for S403 probe output.

Dual Stimulator Capability

The VikingSelect allows two electrical stimulators to be connected to a single system:

- an IES -2 and IES-16

The IES-16 Stimulator has an external address switch that defines its stimulator channels as E1/E2 or E3/E4.

For an IES-2 and IES-16 combination, the IES-16 must be set for E3/E4. The IES-2 Stimulator is hard-wired as E1/E2.

The VikingSelect application automatically selects the appropriate amplifier and stimulator for the test being conducted.

Stimulus Probes

Either S-402 or S-403 Stimulus Probes may be used with the IES-2 Stimulator. The S-402 works only in the Console mode.

SM-402 Stimulus Probe

SM403 Stimulus Probe

Testing

The FireWire Diagnostics for the VikingSelect are the primary tool for testing and troubleshooting the electrical stimulator functional units. Refer to Chapter 6: Troubleshooting for detailed instructions on using the diagnostics.

Patient Signal Path

The Patient Signal Path functional unit is different for each neurodiagnostic system, based on cost and the requirements of each specific application.

The following chart compares the amplifier specifications for each system. Each product is discussed separately on the following pages.

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	Endeavor CR	VikingQuest	VikingSelect
No. of Channels	16, user selectable differential and/or referential	2 or 4	8 with electrode switching 2 or 4 without electrode switching
Sensitivity	10uV to 100mV scale in 13 steps	1uV/division to 10mV/division in 13 steps, 2V p-p max, full scale output	1uV/division to 10mV/division in 13 steps
Input Impedance	>1000 M Ohms	>100 M Ohms	>1000 M Ohms
Common Mode Rejection Ratio	110 dB typical at 50 to 60 Hz	110 dB, typical;105 dB at 50 to 60 Hz, typical	>110 dB (316,227:1) at 50 to 60 Hz >100dB (100,000:1) at 10kHz without electrode switching
Low Filter Settings (-3dB)	Selectable 6 0r 12 dB/octave rolloff; Settings: 0.2, 1, 2, 10, 20, 30, 150, 500Hz User selectable any value from 0.2 to 500 Hz	1 or 2 pole type with 12 dB/octave roll-off; software selectable settings of 1, 2, 5, 10, 20, 30, 150, 500 Hz	0.2, 1, 2, 10, 20, 30, 150, 1K, 2K, 5K Hz; selectable at 6 or 12 dB/octave slope
High Filter Settings (-3dB)	Second-order analog Butterworth low-pass filter with 12 dB rolloff Settings: 100, 250, 500, 1K, 1.5K, 3K Hz User selectable: any value from 100 to 3K Hz	2 pole type with 12 dB/octave roll-off; settings of 15, 30, 100, 250, 1.5K, 2K, 3K, 10K Hz	With electrode switching: 30, 100, 250, 500, 1K, 1.5K, 3K, 5K, 10K Hz; fixed 12 dB/octave slope Without electrode switching: 100, 250, 500, 1K, 1.5K, 3K, 10K, 20K Hz; fixed 12 dB/octave
Noise	0.7uV RMS from 5 to 3K Hz with inputs shorted	<1uV RMS from 1Hz - 10KHz with inputs shorted	<0.7 uVRMS from 2Hz to 10kHz with inputs shorted without electrode switching
Safety Isolation	Fully optically isolated European isolation type BF	Portable: Fully optically isolated European isolation type BF	Fully optically isolated European isolation type BF
Notch Filter	Digital 50 Hz or 60Hz with On/Off	50Hz, 60Hz, On or Off in selected tests	Selectable by application, 50Hz, 60Hz, On or Off
Analog to Digital Converter	Two 16-bit, 8-channel ADCs	16-bit, 1 to 4 channels with 100 KHz maximum sample rate	16-bit, 8-channel ADC
Built-In Calibration	20Hz Sine Wave	External Calibration Out connector	2, 20, 200, 2000, 20,000 uV rectangular pulse
Stimulus Artifact Suppression	Yes	Yes	Yes

Patient Signal Path - Endeavor CR

The Patient Signal Path functional unit is a Nicolet-unique part of the Endeavor CR. The Least Replaceable Units (LRUs) are designed and manufactured by VIASYS Healthcare.

Hardware Components

The signal path functional unit consists of the following components:

• 16-Channel AES Amplifier

• Headbox HB-1

• Headbox HB-2

Amplifier Block Diagram

The block diagram shows the functional components contained within the amplifier housing.

Electrodes from the patient plug into one of two headboxes, which are in turn connected to the amplifier.

Crosspoint switches in the amplifier route the electrode signals to any of the sixteen amplifier channels where they are amplified by a factor of 100, 1000 or 10000. The signals also flow through a High-Pass Filter (HPF) and a Low-Pass Filter (LPF) where selective frequency bands are attenuated.
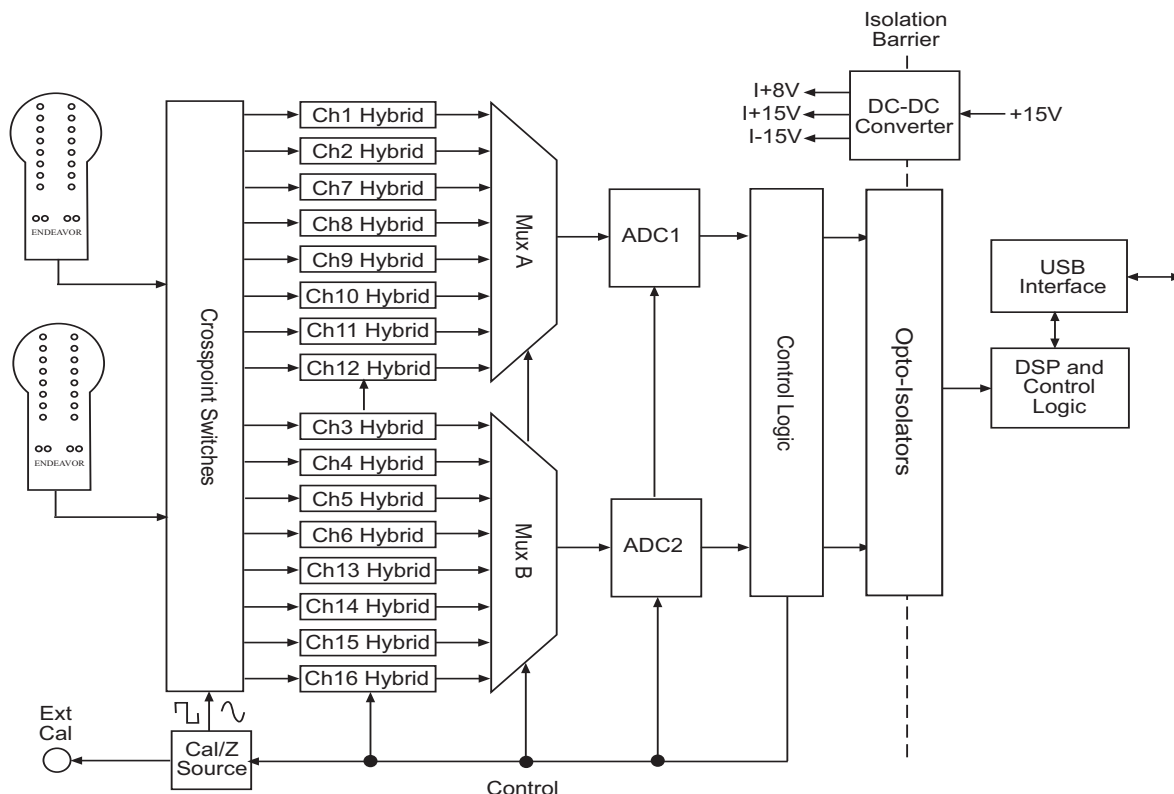
16-Channel Amplifier Block Diagram

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Two analog to digital converters change the filtered analog signals to a series of digital samples. These samples are processed by a digital signal processor (DSP) and transferred to the host PC via a Universal Serial Bus (USB) port. Information for synchronizing the data with stimulus events is placed into the data stream as well.

The digital patient data samples are also mixed and presented via a Digital to Analog Converter (DAC) to an audio amplifier and speaker for listening.

Control and status information from the host PC to the amplifier are exchanged along with the data on the single USB interface cable.

Stimulus Artifact Suppression is implemented in the amplifier and may be used to help counter the effects of electrical stimulus on the measured patient signals. This feature may be applied to individual channels or may be enabled or disabled globally.

Testing

The Endeavor CR USB Diagnostics are the primary tool for testing the amplifier system. The AutoTest checks for proper communication between the base unit and amplifier module, and the Headbox Test uses an internally generated calibration pulse to check the signal path integrity from the electrode input connectors on the headbox to the host computer.

Patient Signal Path - VikingQuest

The Patient Signal Path functional unit is a Nicolet-unique part of the VikingQuest. The Least Replaceable Units (LRUs) are designed and manufactured by VIASYS Healthcare.

Hardware Components

The signal path functional unit consists of the following components:

- 2-Channel Preamplifier (or)
- 4-Channel Preamplifier
- VikingQuest Base

Amplifier Block Diagram

The VikingQuest amplifier system is physically divided between the 2- or 4-channel Preamplifier module and the VikingQuest base board.

Electrodes from the patient plug into the preamplifier module, which provides x10 signal amplification and <100 MOhm common mode rejection.

 The amplified patient signals are routed to the VikingQuest base, where they are further amplified, filtered, isolated, and processed by a 16-bit analog to digital converter.

The filtered analog patient signals are also mixed and presented to an audio amplifier and speaker for listening.
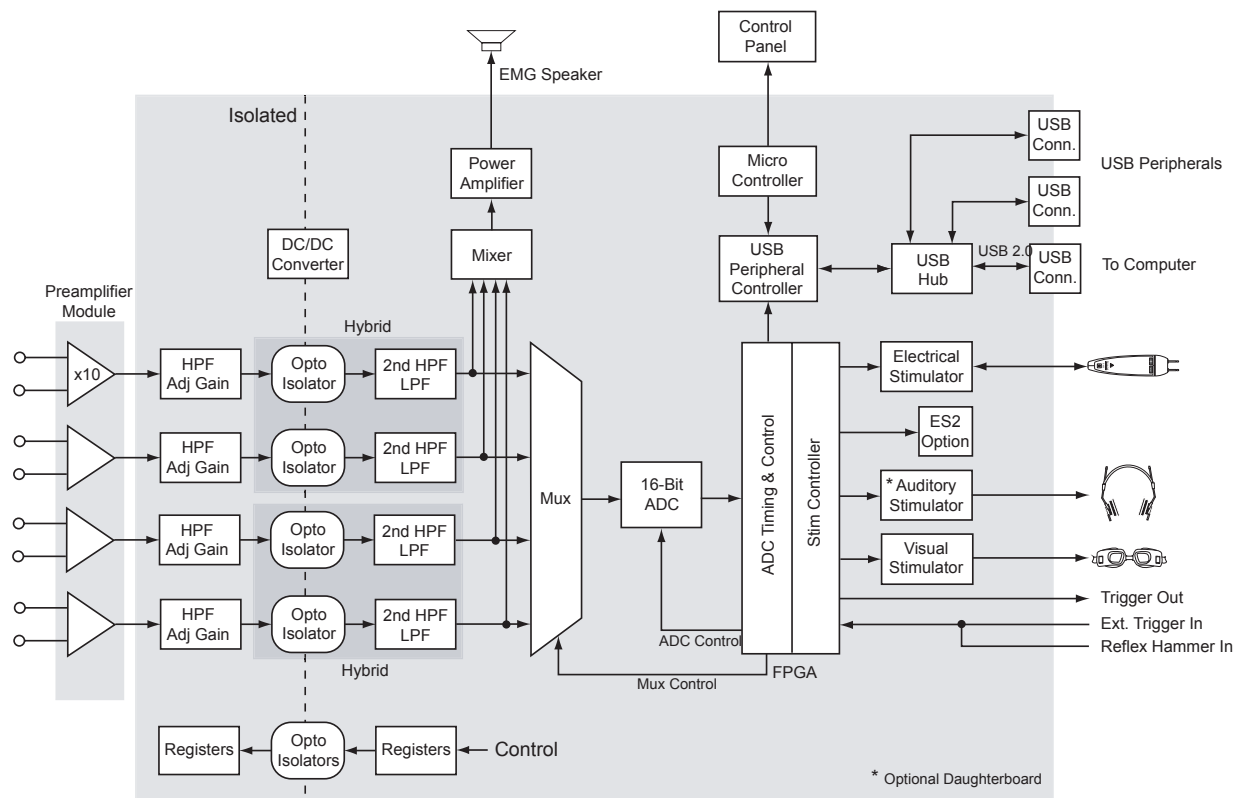
VikingQuest Block Diagram

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The digitized patient signal is transferred to the host PC via a Universal Serial Bus (USB) port. Information for synchronizing the data with stimulus events is placed into the data stream as well.

 Control and status information from the host PC to the amplifier are exchanged along with the data on the single USB interface cable.

Testing

The VikingQuest USB Diagnostics are the primary tool for testing the amplifier system. The AutoTest checks communication with the analog to digital converter on the VikingQuest's base board. The Headbox Test uses the Trigger Out pulse to check the signal path integrity farm the electrode input connectors on the preamplifier to the host computer.

.

Patient Signal Path - VikingSelect

The Patient Signal Path functional unit is a Nicolet-unique part of the VikingSelect. The Least Replaceable Units (LRUs) are designed and manufactured by VIASYS Healthcare.

Hardware Components

The signal path functional unit consists of the following components:

• 2- or 4-Channel EP/EMG Amplifier and/or

• 8-Channel IOM Amplifier with

• Headbox ET16A and

• Headbox ET16B

EA-2 and EA-4 EP/EMG Amplifiers

The following block diagrams show the similarities and differences between the 2-channel and 4-channel EP/EMG amplifiers.

Each amplifier channel offers a five-pin DIN input connector and individual electrode connectors for accepting the patient electrodes. Each channel has an on/off switch for turning off unused channel inputs. The 2- and 4-channel amplifiers also provide a temperature probe input connector.

Input multiplexers, under computer control, select the proper inputs for recording patient data, conducting an impedance test, or running a calibration pulse.

Each Amp/Filter stage contains a differential input amplifier and selectable gain/filter circuits. In the 2-channel amplifier, the Amp/Filter stage is fabricated from discrete components. In the 4-channel amplifier, this stage is a hybrid module.

Two analog to digital converters change the filtered analog signals to a series of digital samples. These samples are processed by a digital signal processor (DSP) and transferred to the host PC via an IEEE 1394 (FireWire) port. Information for synchronizing the data with stimulus events is placed into the data stream as well.

The digital patient data samples are also mixed and presented via a Digital to Analog Converter (DAC) to an audio amplifier and the EMG speaker for listening.

Control and status information from the host PC to the amplifier are exchanged along with the data on the single FireWire interface cable.
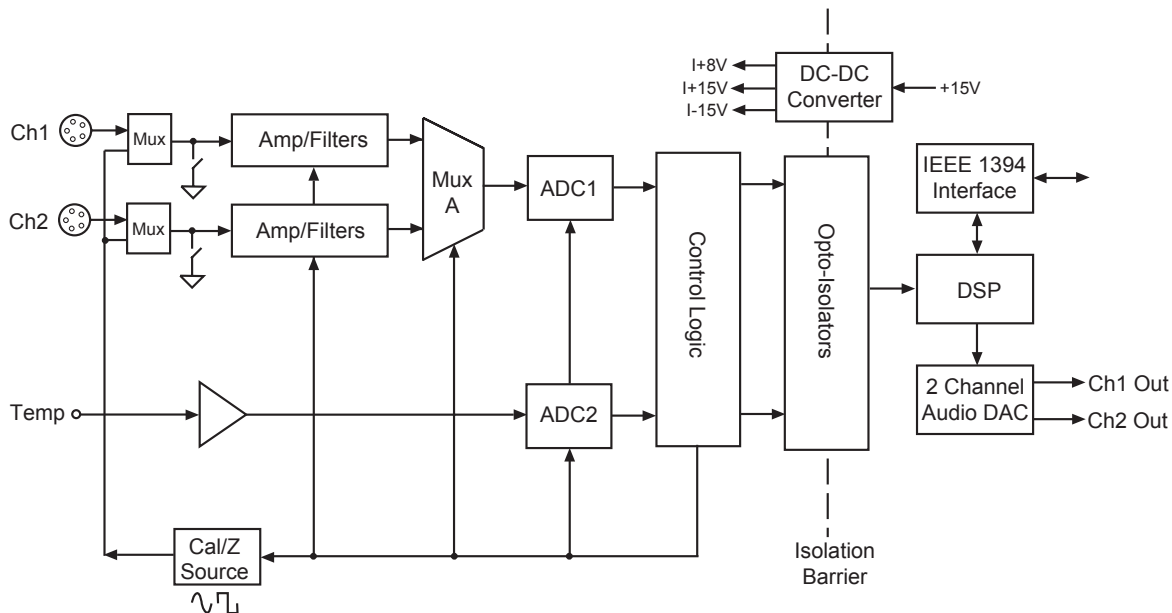
VikingSelect EA-2 EMG Amplifier Block Diagram

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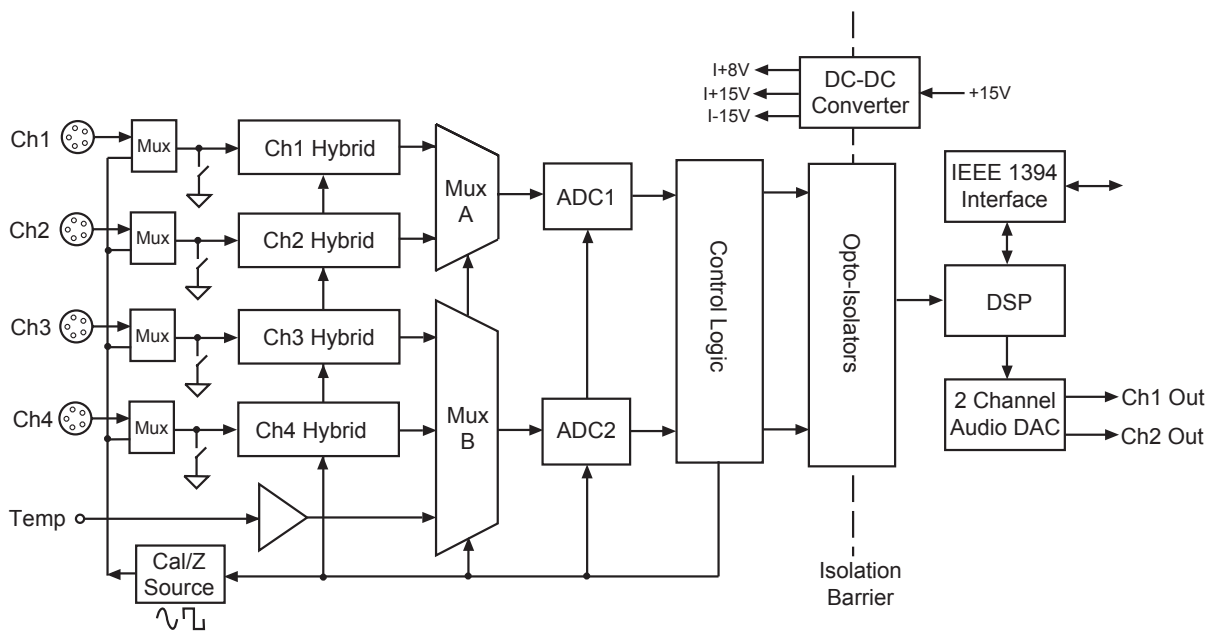
VikingSelect EA-4 EMG Amplifier Block Diagram

ES-8 IOM Amplifier Block Diagram

The block diagram on the next page shows the functional components for the VikingSelect 8-channel IOM amplifier.

Electrodes from the patient plug into one of two headboxes, which are in turn connected to the amplifier.

Crosspoint switches in the amplifier route the electrode signals to any of the eight amplifier channels where they are amplified by a factor of 100, 1000 or 10000. The signals also flow through a High-Pass Filter (HPF) and a Low-Pass Filter (LPF) where selective frequency bands are attenuated.

The remaining stages are identical to those found in the EA-2 and EA-4 amplifiers described earlier.

Stimulus Artifact Suppression is implemented in the amplifier and may be used to help counter the effects of electrical stimulus on the measured patient signals. This feature may be applied to individual channels or may be enabled or disabled globally.

Testing

The VikingSelect FireWire Diagnostics are the primary tool for testing the amplifier system. The AutoTest checks for proper communication between the base unit and amplifier module, and the Headbox Test uses an internally generated calibration pulse to check the signal path integrity farm the electrode input connectors on the headbox to the host computer.
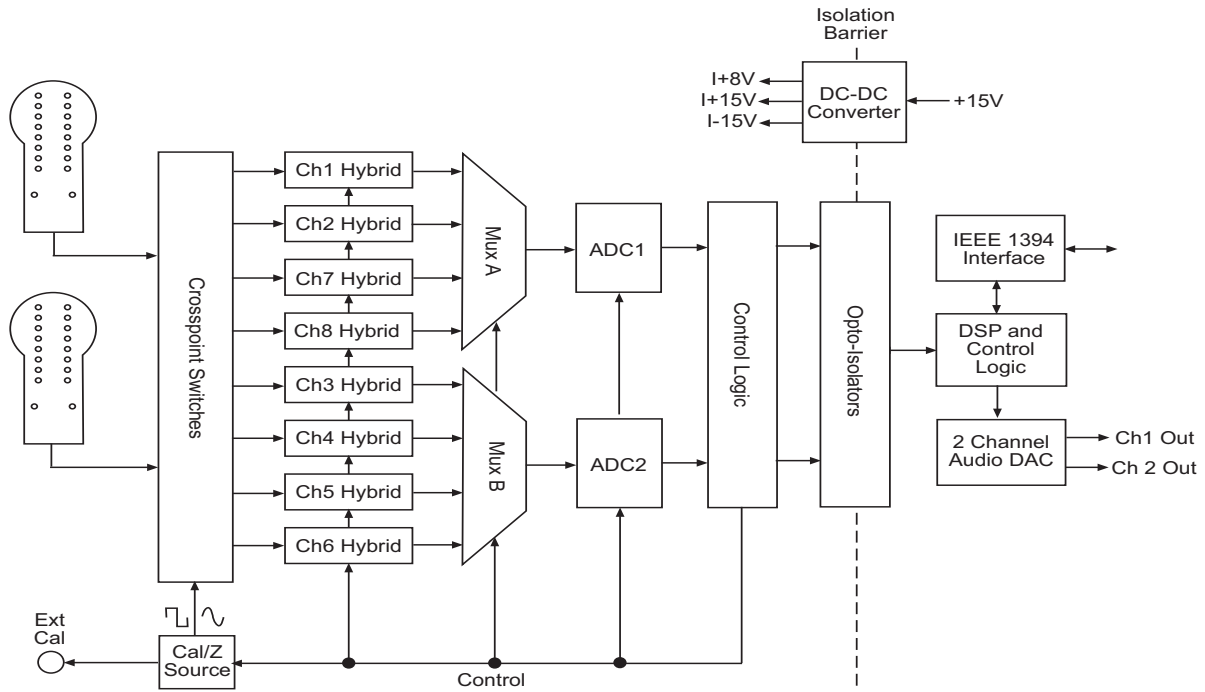
VikingSelect ES-8 IOM Amplifier Block Diagram

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Chapter 4

Software Description

Introduction

This chapter provides an overview of the software packages installed on VIASYS Neurocare systems, and contains the reference information required to load and configure system software while preserving the customer's data files.

VIASYS systems use the Windows XP Professional operating system and manage patient files with the NicVue patient administrator. The primary applications for the system are collecting Evoked Potentials, Electroencephalography, Nerve Conduction Studies and Electromyography.

In addition to the applications listed above, system software also include diagnostics packages, which can be used to troubleshoot VIASYS-unique hardware modules.

Microsoft Office 2003 may also be loaded onto the system. Report generation in Word (Viking family) and html (Endeavor) is available. Excel and Internet Explorer are also loaded.

System software is preloaded and the system tested at the factory before delivery. System problems, however, may require that some or all software be reloaded. As improvements are made, it may be necessary to install software patches and upgrades.

Windows XP Professional Diagnostic Tools

Windows XP Professional provides a range of built-in administrative/diagnostic tools used to maintain and troubleshoot systems. As an example, we have listed below the diagnostic tools that are built into the Windows XP graphic user interface. The utilities listed in bold text are described in this manual. Information on the remaining (and other) tools is available from the Microsoft Windows XP Support website.

Application and Service Tools
- Bootcfg
- **Boot logging**
- **Device Manager**
- DirectX Diagnostic Tool
- **Dr. Watson**
- Error Reporting
- **Event Viewer**
- Group Policy Snap-in
- Online Crash Analysis
- Performance Monitor

- Program Compatibility Wizard
- Registry Editor
- Runas
- Services Snap-in
- **Shared Folders**
- Shutdown Event Tracker
- System Configuration Utility
- **System Information**
- **Task Manager**

Remote Management Tools
- **Computer Management**
- **Remote Assistance**
- **Remote Desktop**

Disk & Maintenance Tools
- **Disk Cleanup**
- **Disk Defragmenter**
- **Disk Management**
- **My Computer Information**
- Windows Update

System File Tools
- Driver Signing and Digital Signatures
- Windows File Protection

Networking Tools
- IP Security Monitor
- **Network Diagnostics**

VIASYS Applications

This section introduces the range of VIASYS application software and describes how the directories and files are organized within the Windows XP environment.

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Windows XP Overview

All VIASYS Neurocare systems manufactured after July 2004 use the Microsoft Window XP Professional operating system.

Laptop computers shipped with VIASYS instruments are pre-loaded with Windows XP, and accompanied by their own Windows XP Reinstallation CDs, Driver CDs and application CDs

Desktop computers provided by VIASYS use a special BIOS-locked version of Windows XP. This version of XP is pre-activated, and allows the adding and swapping of expansion cards. However, if the hard drive is moved to a different motherboard, XP is de-activated, and expires in 90days.

A Windows XP Professional OEM CD, which matches the Windows XP serial number loaded on the system, accompanies each desktop system. This CD is not an Image CD - it contains no device drivers. Device drivers must be loaded separately. If the Windows XP CD is lost and the hard drive fails, there is no automatic replacement. The user must purchase a new copy of Windows XP.

Windows XP Help and Support Center

Windows XP Professional features an extensive set of diagnostic and troubleshooting tools. There are several ways to access these tools, however, the easiest way is to click on **Start> Help and Support**. From the **Pick a Task** header, select **Use Tools...**. From the **Tools** list, select an item from the menu. Clicking on a menu item either opens a sub-menu, opens a utility, or provides a deeper level of information for the selected item.
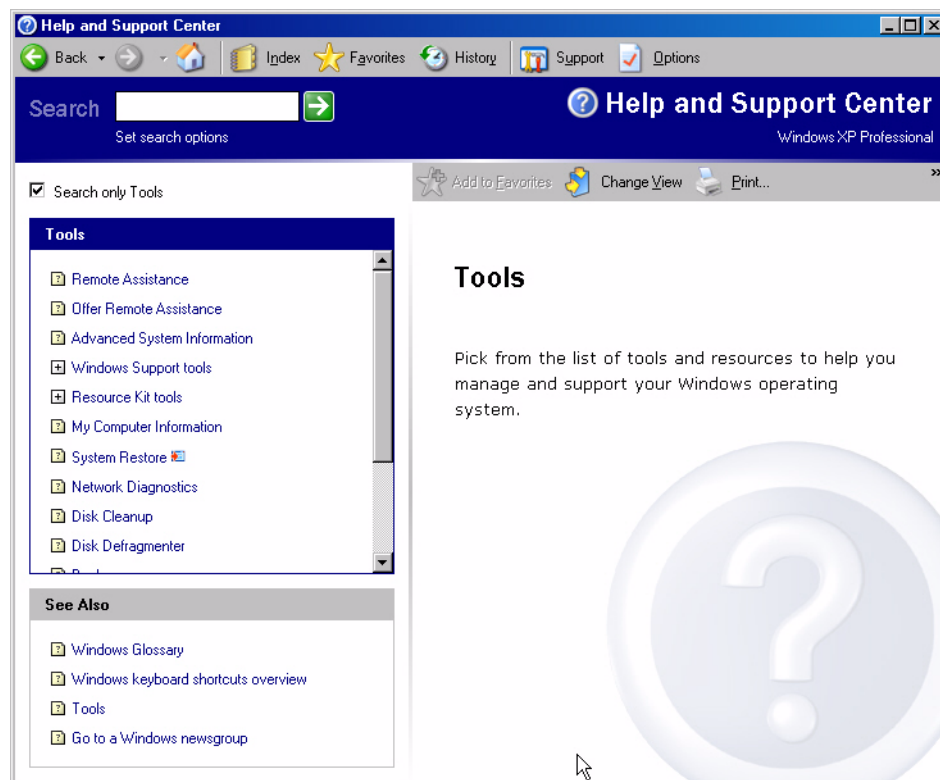
Help and Support Center/ Tools Window

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Remote Assistance

Remote Assistance allows you to invite a trusted person to remotely and interactively assist you with a problem.

Offer Remote Assistance

This administrative tool allows an expert with Administrative rights to open a remote session without first receiving an invitation. Offer Remote Assistance is disabled by default, and is not used by VIASYS.

Advanced System Information

This tool provides five links to detailed system information, including hardware/software status and error reports.

Windows Support Tools

This link provides instructions for loading advanced support tools form the Windows XP Professional CD.

Resource Kit Tools

This web link provides access to the Windows XP Professional Resource Kit Documentation.

My Computer Information

This menu item under *Help and Support Center /Tools* allows you to view your computer's hardware and software status, and provides diagnostic information about the health of the computer system. The difference between this tool and the Device Manager (described later in this chapter), is that this is a view-only tool.
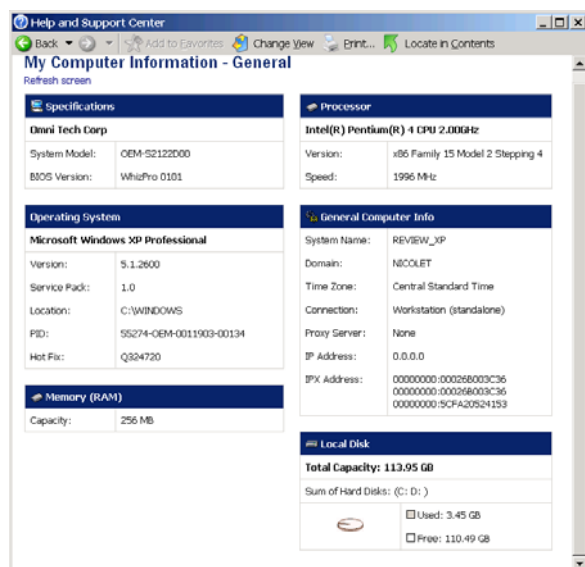
My Computer Information Screen

System Restore

The System Restore utility allows you to roll back the system files to a point before a problem occurred. Restore points are created every time you load an application in Windows XP. You can manually create restore points as well. The procedure for doing a system restore is provided in Chapter 5 of this manual.
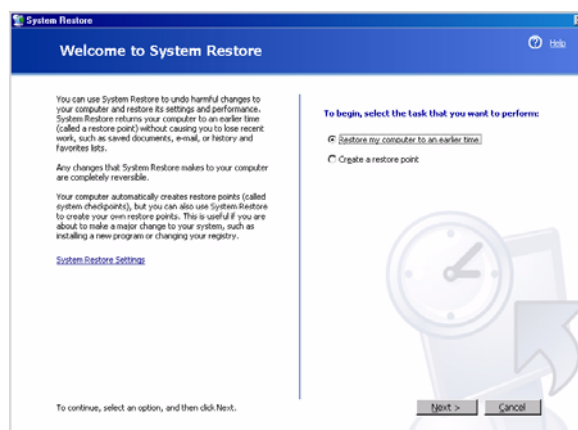
System Restore Screen

Network Diagnostics

The Network Diagnostics allow you to view software and hardware network component information from a central location. Depending on the scanning options you select, Network Diagnostics scans your system to see whether you have network connectivity, and whether your network-related programs and services are running. To run Network Diagnostics:

Step	Action
1.	Click on **Start> Help and Support**. The *Help and Support Center* window opens.
2.	Under *Pick a Task*, click on **Tools**.
3.	Under *Tools*, click **Network Diagnostics**.
4.	Under *Network Diagnostics*, click on **Scan your system**.

Network Diagnostic Results Screen

Disk Cleanup (cleanmgr.exe)

Disk Cleanup allows you to delete unneeded files and periodically compress infrequently accessed files.

Refer to Chapter 5 for instructions on using Disk Cleanup.
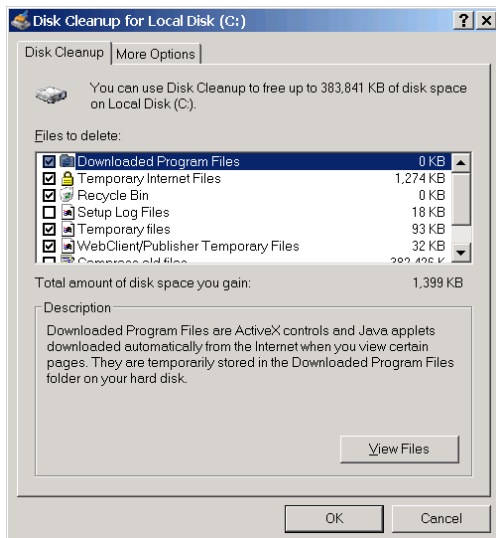
Disk Cleanup Window

Disk Defragmenter (dfrg.msc)

Disk Defragmenter rearranges files, folders, and programs so that they occupy contiguous space on the hard disk. This tool also reorders free space, moving it into a contiguous block at the end of each volume.

Software Description

Refer to Chapter 5 for instructions on using the Disk Defragmenter.
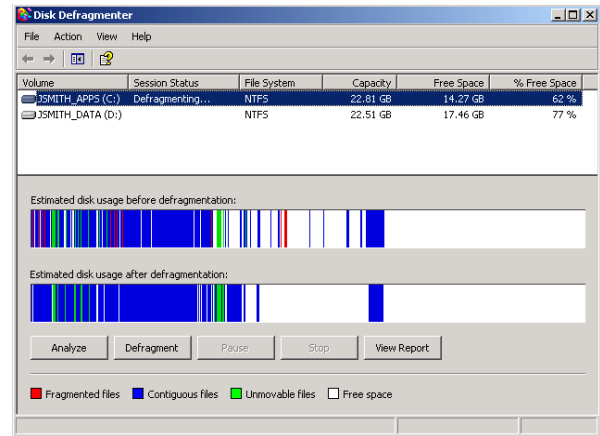
Disk Defragmenter Window

Backup

VIASYS does not routinely use the backup tool. For more information on this topic, consult the Windows XP Professional Resource Kit documentation.

System Configuration Utility

The System Configuration Utility allows you to start Windows XP Professional in Normal, Diagnostic, or Selective Startup mode. For advanced users. Consult the Windows XP Professional Resource Kit documentation for detailed information regarding this tool.

Command-Line Reference A-Z

This glossary provides an alphabetized list of commands that can be run from the Windows XP command line.

Click on **Start>Run** and type **cmd** to open the DOS Command window. Type **help** to see the list of commands, then type **help** *command* to view detailed help regarding the selected *command*.

New Command-Line Tools

This table lists and defines the new Windows XP Professional command-line tools.

Command Shell Overview

This link to on-line help provides instructions for using the command shell.

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Additional Windows XP Tools

The following section highlights additional XP support tools for advanced users and that may be appropriate for field use. These are presented in alphabetical order for easy reference.

Boot Logging

If your computer stops responding during startup, boot logging allows you to identify initialized drivers. This information is useful if your computer cannot complete the startup process. By examining the boot log, you can identify the filename of the last file processed, which might be causing the problem. You can then focus your troubleshooting efforts on the suspect file and replace the file or search for an update.

To enable boot logging:

Step	Action
1.	Restart the computer.
2.	Toward the beginning of the boot process, the system displays briefly a black and white text screen, and prompts you to press F8 for troubleshooting and advanced startup options. Press **F8** in response to the prompt.
3.	Select **Enable Boot Logging** on the *Windows Advanced Options Menu,* and press **Enter**.
4.	Press **Enter** to resume the boot process.
5.	Search for and examine the contents of the file ntbtlog.txt.

Computer Management (compmgmt.msc)

The Computer Management tool provides the following set of utilities, which are useful for performing common computer management tasks, or for gathering information about local and remote computers for troubleshooting.

- Event Viewer (eventvwr)
- Shared Folders
- Local Users & Groups
- Performance Logs
- Device Manager
- Disk Defragmenter
- Disk Manager

To access the Computer Management window, right-click on **My Computer**, then click on **Manage** from the drop-down menu.
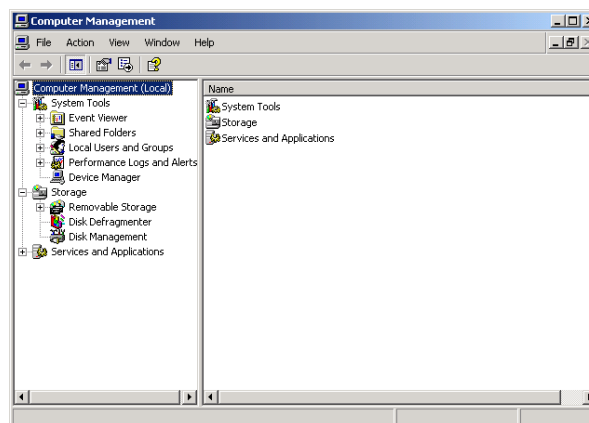
Computer Management Window

NOTE:

Windows XP's on-line help system provides detailed information about the Computer Management tools. To access information that is beyond the scope of this manual, right-click on an **icon** in the *Computer Management* window, then select **Help** to view context-sensitive topics.

Device Manager

The Device Manager displays all devices installed on the system, which represents the computer's hardware configuration information. The Device Manager display is recreated every time the computer is started, or whenever a dynamic change to the computer information occurs, such as the addition of a new device while the system is running. You can use the Device Manager to enable or disable devices, troubleshoot devices, update drivers, use driver rollback, and change resources such as interrupt requests (IRQs).
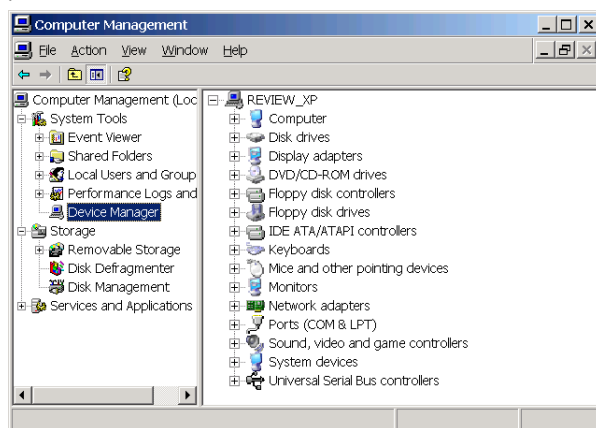
Device Manager Window

To open the Device Manager:

Step	Action
1.	Right click on **My Computer**, and select **Manage** from the drop-down menu. The *Computer Management* window opens.
2.	Under *System Tools*, click on **Device Manager**. The device list appears in the right-side panel.
3.	Click on the **View** menu item to select one of four available views of the device list.

Disk Management (diskmgmt.msc)

The Disk Management window provides a view of the status of disks and volumes. Click on **Start>Run**, then type **diskmgmt.msc** in the *Run* dialog box.
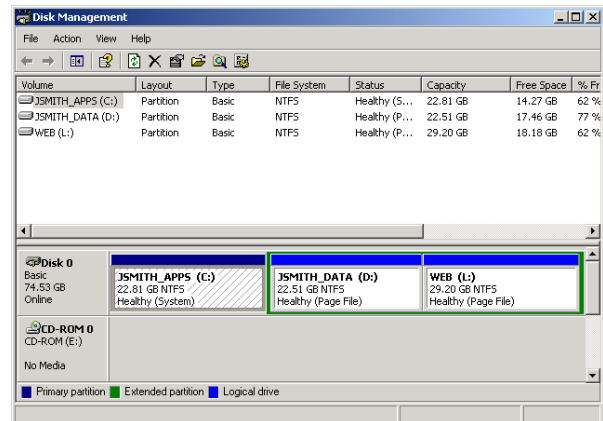
Disk Management Window

Disk Properties/Error Checking

The Disk Management window provides access to the *Disk Properties/Error Checking* function.
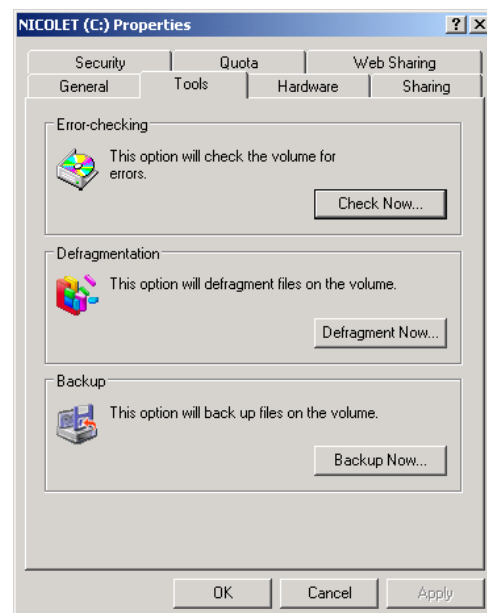
Disk Properties Window

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In the *Disk Management* window, highlight a disk, then select **Action> All Tasks> Properties**. Click on the **Tools** tab to access the Error Checking utility. Click on **Check Now** to display the Check Disk options window.
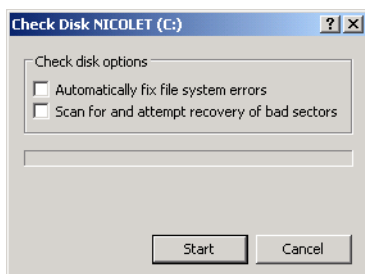
Check Disk Options Window

If both check boxes are blank, or if "Scan for and attempt recovery of bad sectors" only is checked, the test starts immediately when you click on **Start**.

The "Scan for... bad sectors" test may require a half hour or longer to complete. For a quick disk check, leave both option boxes unchecked.

If "Automatically fix file system errors" is checked, the system requests permission to reboot, and conducts the disk check during the boot process.

Dr. Watson (drwtsn32.exe)

In the event of an application error. the Dr. Watson tool writes information to a text-based log file named DrWtsn32.log. This log contains the following information:

• The file name of the program that caused the error.

• Information about the computer and user under which the error occurred.

• A list of programs and services active when the error occurred.

• A list of modules, such as DLLs, that were in memory when the error occurred.

• Additional information that might be needed for technical support.
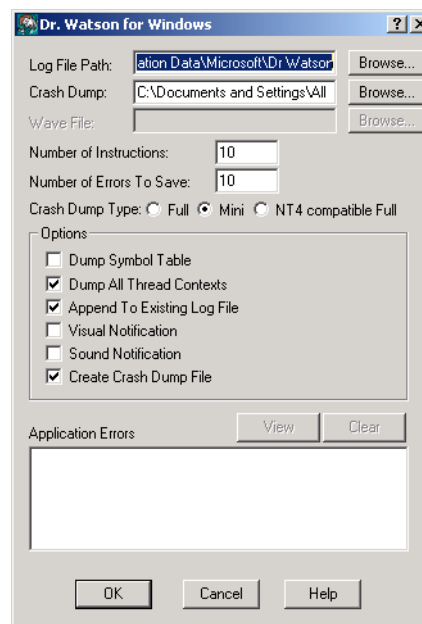
Dr. Watson Window

To view the Dr. Watson log:

Step	Action
1.	Click on **Start> Run**.
2.	In the *Run* dialog box, type: **drwtsn32** and click on **OK**. The *Dr. Watson* window pops up. Problem descriptions appear in the *Application Errors* panel.
3.	Select an entry, then click on **View** to display more information about the error.

Error Reporting

When Windows XP detects an operating system or application error, you can send an anonymous report to Microsoft. An automated process searches the error-reporting database for matching conditions and responds with any troubleshooting information found.

To enable the Error Reporting feature,

Step	Action
1.	Click on **Start> Settings> Control Panel> System> Advanced> Error Reporting**.
2.	In the *Error Reporting* dialog box, select **Enable error reporting** and checkmark the boxes for **Windows operating system** and **Programs**.
3.	Click on **OK** to close the *Error Reporting* window.
4.	Click on **OK** to close the *System Properties* window.
5.	Close the Control Panel window.

Event Viewer (eventvwr.msc)

The Event Viewer maintains application, security, and system logs for your computer. Examining the logs can provide detailed information about hardware, software and system problems.
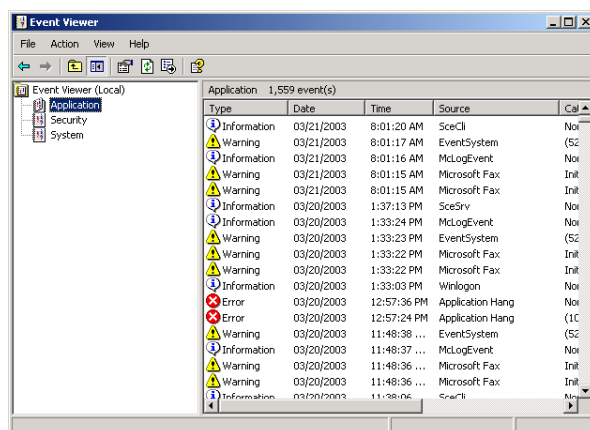
Event Viewer/Application Log

The **Application Log** contains events logged by applications or programs. For example, a database

program might record a file error in the application log. Program developers decide which events to monitor.

The **Security Log** records events such as valid and invalid logon attempts, as well as events related to resource use such as creating, opening, or deleting files or other objects. There is no practical reason for enabling security logging for VIASYS-only networks, therefore this log is not utilized by default.

The **System Log** contains events logged by Windows XP system components. For example, the failure of a driver or other system component to load during startup is recorded in the system log. The event types logged by system components are predetermined by Windows XP.

To open the Event Viewer,:

Step	Action
1.	Click on **Start> Run**.
2.	In the *Run* dialog box, type: **eventvwr.msc** and click on **OK**. The *Event Viewer* window pops up.
3.	Double click on a **log** icon to view the list of errors recorded in that log.
4.	Double click on a **list item** to view details about the selected error.
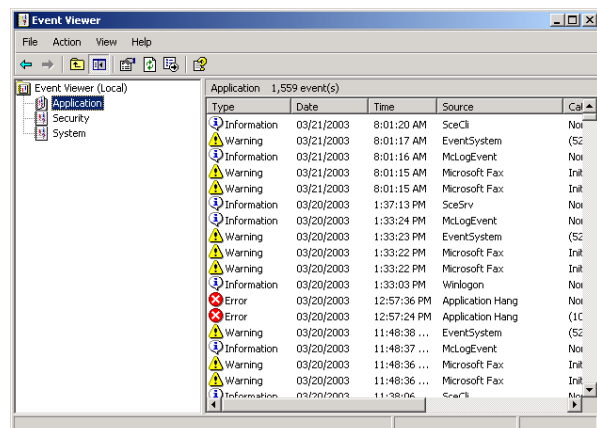
Event Viewer Application Log Screen

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Online Crash Analysis
Sends kernel memory dump files to a web site hosted by Microsoft for evaluation. An automated process searches a database of known issues for matching conditions. You can optionally receive email updates about your problem.

Performance Monitor (perfmon.msc)
The Performance Monitor obtains and displays data that is useful for detecting and diagnosing bottlenecks and changes in overall system performance.

Shared Folders
You can use Shared Folders to view a summary of connections and resource use for local and remote computers. With Shared Folders, you can:

- Create, view, and set permissions for shared resources.
- View a list of all users who are connected over a network to the computer, and disconnect one or all of them.
- View a list of files that have been opened by remote users, and close one or all of the open files.

Shared Folders is available from the *Computer Management* screen.

System Information (msinfo32.exe)
The System Information window displays hardware and software configuration information in an organized graphical manner. This includes all of the system resources, hard disk utilization, memory allocation, page file sizes, graphics card specifications and other configuration information.

System Information is a viewing window only; items can not be changed in this utility. You have the option to print this information to a printer or text file.

Task Manager
The Task Manager allows you to view or end a process or an unresponsive application. To access the Task Manager, press **Ctrl+Alt+Del**. In the *Windows Securities* pop up window, click on **Task Manager**.

Additional Information

An electronic version of the Microsoft XP Professional Resource Kit Documentation is available over the Internet. Click on **Start> Help and Support> Tools >Resource Kit tools> Windows Resource Kit tools Help**. In the right-hand panel, click on the link to **Windows Resource Kits** to access the Windows XP website, and follow the links to *Windows XP Professional Resource Kit Documentation on TechNet*

The Windows XP Professional Resource Kit Documentation is available in book form from Microsoft Press.
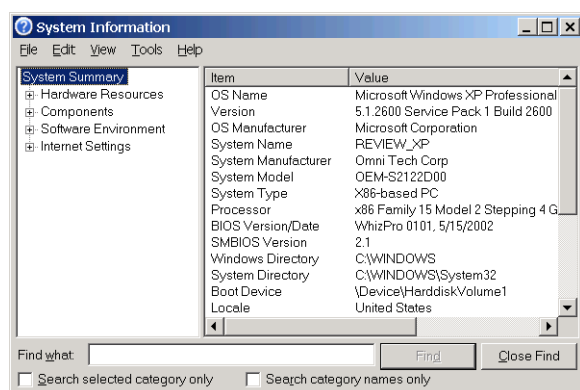
System Information Screen

VIASYS Applications

The VIASYS neurodiagnostic systems use six
VIASYS-specific applications:

- Endeavor CR acquisition/review program
- VikingQuest program suite
- VikingSelect program suite
- USB/FireWire Diagnostics
- USB Host/FireWire Host
- NicVue patient database administrator (optional)

User Accounts

VIASYS Neurocare systems ship with the following
standard accounts:

Standard VIASYS Accounts		
Account User Name	Password	Group
Nicolet	None	Administrator
Administrator	nicolet	Administrator

Starting April 2003, hospitals in the United States are
required to comply with HIPAA standards (Health
Insurance Portability & Accountability Act of 1966). In
many instances, the standard VIASYS accounts may be
replaced with individual accounts unique to each
institution for reasons of security.

Directory/File Structure

The file/directory structure for Windows XP-based
systems is different from VIASYS' Windows NT-based
instruments. VIASYS Neurocare no longer partitions
physical hard drives or uses volume sets.

Standard VIASYS XP-based desktop systems contain a
single 80GB (or larger) hard drive designated the C:
drive. (Some systems offer the option of an additional
hard drive.)

The acquisition application and the NicVue application
reside in C:\Nicolet to maintain compatibility with
VIASYS Neurocare's earlier Windows NT-based
systems.

The chart in the right column summarizes the Endeavor
CR directory/file structure.
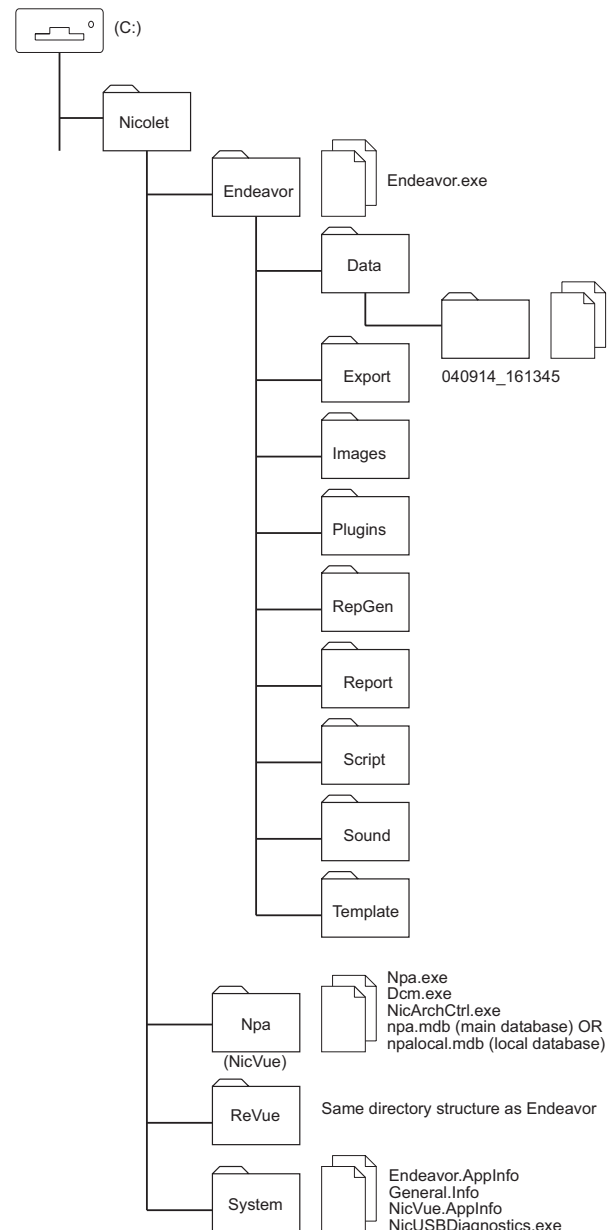
Endeavor CR Directory/File Structure

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Endeavor CR, VikingQuest and VikingSelect Applications

Refer to the System User Guide(s) and On-line Help for details regarding the options/use of these software packages.

NicVue 2.6

The NicVue patient database administrator is an optional package for the Endeavor CR, VikingQuest and VikingSelect. NicVue version 2.6 is licensed software that must be activated prior to its first use. Activation may be done automatically over the internet or by telephone.

The features of NicVue 2.6 with respect to prior versions are:

- Enhanced reliability

- DVD+R support for archiving

- VIA Link bi-directional interface to the Hospital Information System (HIS) or local patient database (option).

NicVue 2.6 supports the following VIASYS products:

- AllianceWorks

- Bravo

- BMSI

- TCD

- UltraSom

- Viking

- Endeavor

NicVue Database Utilities

NicVue V2.6 provides a set of database utilities that can be run as part of routine maintenance, or when problems are suspected.

To access these utilities, open NicVue and click on **Tools>Database>Utilities** password: **nicolet**.

The following chart defines each utility and recommends when it should be used.

Operation	What	When & Why
Backup	Makes a backup copy of the existing database. Can optionally compact the database before backing it up.	Run weekly as part of a scheduled maintenance routine.
Compact Database	Optimizes the size of the database.	Run weekly as part of a scheduled maintenance routine.
Check Database	Compares the list of patient names in the database to the actual patient folders. Displays a list of duplicate patient names or patient names with no linked exams. NicVue provides the option of automatically fixing errors.	Run monthly as part of a scheduled maintenance routine. Duplicate patient names my result from merging databases, or from the customer making changes to the database outside of NicVue.
Check Data Links	Compares each patient's exam record in the database to the patient exam folders. Displays exams that it cannot find.	Use when you suspect "lost" exams. The Data Links report shows the exams supposedly on a local or network hard drive that NicVue cannot find.
Remove Inactive Records	NicVue V2.25 (by default) maintained a history of all changes made to patient records (for example, changing the name Bill Abbott to Wilson Abbott). This utility removes the older, inactive information. Note: History was originally included for troubleshooting purposes, and is analogous to the "history" maintained by a web browser.	Use once when updating from NicVue V2.51 to NicVue V2.6 to reduce the size of the database. In NicVue V2.25, the link to this utility is located on the hidden service screen.
Remove Deleted Exams	Removes any history record of exams marked as "deleted "(marked with a red "x").	Use as necessary to reduce the size of the database (symptom: slow operation).

Other NicVue Utilities

Two NicVue utilities are available from Windows Explorer by browsing to C:\Nicolet\Npa.

DCM.Exe

This utility opens the *DCM Setup* window from outside the NicVue application.

NicArchCtrl.Exe

This utility selects the archive server (archiving program) for use with NicVue V2.6. The selectable options are:

- NicVue Archiving Server
- Adaptec Easy CD Creator V4.05
- Roxio 5.3

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Introduction

This chapter contains detailed procedures required for the installation, verification, maintenance and repair of the Endeavor CR, VikingQuest, and VikingSelect instruments. The procedures are ordered from the most commonly performed to the least commonly used.

System Verification Checklist & Procedures

Use this checklist and the associated functional procedures to verify the system is working properly.

Routine Backup and Maintenance Procedures

These procedures are routinely performed by instrument operators and hospital service personnel.

VIASYS Software Loading Procedures

Set up Windows XP Display and Desktop Properties

This section describes the steps necessary to optimize Windows XP for use with the VIASYS applications.

System Drivers

This section covers the loading and configuration of network and printer drivers.

MS Office (option)

This section covers the steps required to install Microsoft Office (optional) for report generation on the VikingQuest and VikingSelect.

NicVue (option)

This section covers the steps required to install and license the NicVue Patient Database Administrator (optional).

Endeavor CR Application

This section covers the steps required to install the Endeavor CR application package.

VikingQuest Application

This section covers the steps required to install the VikingQuest and VikingSelect application package.

VikingSelect Application

This section covers the steps required to install the VikingSelect application package.

Setup NicVue

This section describes the steps required to set up a new Nicolet-only network and configure it to run NicVue.

Windows XP Repair Procedures

This section describes how to restore a previous set point in Windows XP and how to perform a repair of the Windows XP operating system.

Windows XP Load

This section describes how to perform a complete load of Windows XP using the computer vendor's Windows XP CD.

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System Verification Checklist

System Owner:	
System Serial Number:	
Software Version:	

Use this checklist and the following functional procedure to verify the system is working properly. Most steps require no access to the interior of the instrument, and may be performed by the system operator. Internal desktop computer checks must be performed by a qualified and trained Biomedical Engineer.

System Inspection & Cleaning

- ❑ Check board seating & internal cables (desktop systems only)
- ❑ Clean/vacuum dust from ventilation slots
- ❑ Check external cables
- ❑ Clean instrument exterior/accessories
- ❑ Check fans

Computer

- ❑ System boots properly
- ❑ Check Device Manager
- ❑ Check event logs
- ❑ Run Check Disk
- ❑ Run Defrag

USB/FireWire Diagnostics

- ❑ AutoTest
- ❑ Board Report
- ❑ Amplifier/headbox test
- ❑ Auditory stimulator test
- ❑ Electrical stimulator test
- ❑ Control panel test

Miscellaneous Functions

- ❑ LED goggles
- ❑ Foot switch
- ❑ Reflex hammer
- ❑ Trigger In
- ❑ Trigger Out
- ❑ EMG speaker
- ❑ Temperature read
- ❑ Impedance Limited reading (VS only)

Application Verification Tests

(Perform one or more of the following)

VikingQuest and VikingSelect

- ❑ Auditory Evoked Potential
- ❑ Visual Evoked Potential
- ❑ Somatosensory Evoked Potential
- ❑ Motor Nerve Conduction
- ❑ Sensory Nerve Conduction
- ❑ SPA EMG (surface electrode only)
- ❑ Report Generation (HTML or MS Word)
- ❑ Report printing

Endeavor CR

- ❑ Endeavor Application Checks

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System Verification Tests

Use this procedure to verify your instrument is functioning properly.

System Inspection & Cleaning

Step	Action
1.	If your desktop system is being newly installed, or has been moved frequently, remove the computer cover, reseat any boards in the expansion slots, and verify the internal cables are securely connected.
2.	Visually inspect all external system wiring for any damaged or unseated cables. Replace any damaged cables as needed.
3.	Check for excessive dust accumulation at the power supply and computer vents. If necessary, vacuum away the accumulated dust outside of the isolated power supply and computer.
4.	Clean the exterior of the instrument and the system accessories as described in Chapter 1 of this manual, under *Cleaning the System*.
5.	Turn on power to the system and verify that the ventilation fans are turning on the base units and the computer.

Computer

System boots properly

Step	Action
1.	Press **Ctrl-Alt-Del** to get to the logon screen.
2.	Log on to the system using your normal username and password.
3.	Verify the system boots to the Windows XP desktop.

Check the Device Manager

Step	Action
1.	Right click on **My Computer**, and select **Manage** from the drop-down menu. The *Computer Management* window opens.
2.	Under *System Tools*, click on **Device Manager**. The device list appears in the right-side panel.
3.	If necessary, click on the **View** menu item to select the *Devices by type* view.
4.	Verify all devices in the list are working properly (no yellow question mark or exclamation point shown on a device icon). If a question mark or exclamation point is present, right click on the affected icon and select **Properties** from the drop-down menu to explore the cause of the device failure. You may need to contact a biomedical engineer or VIASYS Customer Support for assistance in resolving device issues.

Check the event logs

Step	Action
1.	Right click on **My Computer**, and select **Manage** from the drop-down menu. The *Computer Management* window opens.
2.	Under *System Tools*, click on **Event Viewer**. The Application, Security and System Log icons appear in the right-side panel.

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Step	Action
3.	Double click on the System Log icon to expand the list. Review the list to see if there is a pattern of warnings or errors present.
4.	Double click on each warning and error to view detailed information about the log entry and to access links to troubleshooting information. You can also scroll between log entries to review them.
5.	Repeat steps 3 and 4 for the Application log.
6.	Review and investigate the causes for any Warning or Error entries, or patterns of entries, and try to resolve them. You may wish to contact VIASYS Customer Care for help.

Run Check Disk

Step	Action
1.	From the XP desktop, double click on **My Computer**. Right click on **Local Disk (C:)** and select **Properties** from the drop-down menu.
2.	In the *Local Disk (C:) Properties* window, General tab, verify that the Free Space is greater than 25%. If the Free Space is less than 25%, archive and delete the patient exam files on the hard drive before proceeding further.
3.	Click on the **Tools** tab to bring it to the forefront. In the *Error checking* panel, click on **Check Now**. The *Check Disk (C:)* window opens. Leave both check boxes empty and click on **Start**. When the process finishes without errors, the system displays a *Disk Check Complete* window.
4.	Click on **OK** to close the completion window.
5.	If you encountered errors, run the check disk utility again, this time with both *Check disk option* boxes check marked. This will require you to reboot the system.

Defragment the Hard Drive

Step	Action
1.	If necessary, re-open the *Local Disk (C:) /Properties* window.
2.	Click on the **Tools** tab to bring it to the forefront. In the *Defragmentation* panel, click on **Defragment Now**. The *Disk Defragmenter* window opens. Click on **Analyze** to determine if defragmentation is necessary. If recommended, click on **Defragment**.

NOTE:

Due to the large capacity of the hard drive, the defragmentation process may take a significant amount of time to finish, typically 20 minutes to an hour. A completion window appears when the process finishes.

Step	Action
3.	Click on **OK** to close the completion window. Click on **OK** to close the *Local Disk (C:) Properties* window.

USB/FireWire Diagnostics

The Endeavor CR, VikingQuest and VikingSelect systems contain built-in diagnostic programs that allow comprehensive testing of the system's amplifier and stimulator modules

Step	Action
1.	From the desktop, double-click on the USB or FireWire Diagnostics icon.
2.	Refer to Chapter 6:Troubleshooting for instructions on running and interpreting the USB or FireWire diagnostics for your system. Verify that all tests passed.

Miscellaneous Functions

The Endeavor CR, VikingQuest and VikingSelect systems contain other VIASYS-unique I/O connectors and functions required by the applications.

For Endeavor CR, go directly to page 5-9: Endeavor CR Application Checks to test the miscellaneous functions.

For VikingQuest and VikingSelect, continue here.

Since the VikingQuest and VikingSelect have different control panels and somewhat different user interfaces, the following steps are general in nature. If necessary, consult your system operator or the system user guides for assistance in moving through the menus and changing settings.

LED Goggles

Step	Action
1.	Connect the LED Goggles to the system.
2.	Enter the **EP/VEP** test.
3.	From the Settings screen, set up the option for testing **Both Eyes**.
4.	In the waveform screen, switch on the stimulator. Verify that the Left and Right LED arrays flash and that all LEDs in each array light up.

Foot switch

Step	Action
1.	Connect the foot switch to the system.
2.	Enter the **NCS/MNC** test waveform screen.
3.	From the *Settings screen,* select **Recurrent** stimulation.
4.	Press the foot switch a few times and verify that the screen message displayed at the top-left of the waveform screen, switches between RUN and STOP. Assure that no contact bounce occurs.

Reflex hammer

Step	Action
1.	Connect a reflex hammer to the system.
2.	Enter the **NCS/MNC** test.
3.	From the Settings screen, set the stimulator type to **Reflex Hammer**.
4.	In the waveform screen, tap the reflex hammer against your hand. Each tap should trigger a data sweep.

Trigger In

Step	Action
1.	Connect a BNC cable to the Trigger In connector.
2.	Enter the **NCS/MNC** test.
3.	From the Settings screen, set the stimulator type to **External Device**. The *Trigger Polarity* setting is not important for this test.
4.	Display the waveform screen. At the free end of the BNC cable, briefly touch the ground and active leads together with a paper clip or another metal object. Each time you touch the leads together, you should trigger a data sweep.

Trigger Out

The VikingQuest provides a single Trigger Out connector; the VikingSelect has two Trigger Out connectors. The Trigger Out signal is a standard TTL logic level pulse (0V to +3.5V) with a duration of 100 us.

If your Trigger Out signal is being used to trigger an external stimulator, such as the Nicolet 2015, the easiest way to test the signal is to perform a functional test using the stimulator. You can also measure the Trigger Out pulse using an oscilloscope.

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EMG speaker

Step	Action
1.	Set the Audio volume control knob to 0 (fully counterclockwise).
2.	Enter the **EMG/SPA** test and display the waveform screen.
3.	Set the SNS level to 100uV, to provide an appropriate level of background noise.
4.	On the Control Panel, turn the Audio volume control knob clockwise slowly to verify a linear increase in sound from the EMG speaker.

Temperature read

Step	Action
1.	Enter the **NCS/MNC** test and display the waveform screen.
2.	Insert the temperature probe into its connector. "Temp=XX" text appears at the bottom right side of the waveform screen.
3.	Note the temperature reading displayed.
4.	Warm the probe between your fingers and note the temperature reading. It should increase.

Impedance Limited reading (VikingSelect only)

The VikingQuest does not have an impedance limited detection circuit.

Step	Action
1.	Enter the **EP/SEP** test and display the waveform screen.
2.	Set the following parameters: Mode = Remote Type = Current Range = 10mA
3.	Starting from 0%, turn the Stimulus Intensity knob to increase the stimulus intensity reading. With the probe tips open, the system should display an IMEDANCE LIMITED message at the upper left of the waveform screen when the stimulus intensity exceeds 1mA. The message should disappear when you turn the intensity back to 0%.
4.	Place a 4k load across the probe tips, or apply some conductive gel to the probe tips and place them against your skin (thumb muscle or wrist). Turn up the Stimulus Intensity knob slowly to about 6 mA. The system should not display the Impedance Limited message while current is being delivered.
5.	Repeat steps 3 and 4 for each stimulator channel in the both the Console and Remote modes of operation.

VikingQuest/VikingSelect Application Checks

Perform one or more of the following tests. Include the steps of generating and printing a report for one test.

Since the user interface, menu layout and installed options will vary between the Viking systems, consult your system operator or a system user's guide for the sequence of steps to follow.

- ❑ Auditory Evoked Potential
- ❑ Visual Evoked Potential
- ❑ Somatosensory Evoked Potential
- ❑ Motor Nerve Conduction
- ❑ Sensory Nerve Conduction
- ❑ SPA EMG (surface electrode only)

Endeavor CR Application Checks

16 Channel Verification

Step	Action
1.	On the Windows desktop, double-click on the **Endeavor Templates** icon.
2.	In the *Template* window, double-click on the **Service** folder.
3.	Double-click on the **Stim Verification.xef** file to open the Endeavor application with the *16 Channel Verification* window showing.
4.	On the launch bar, click on the **Auditory**, **Visual** and **Audio** icons to hide their respective panels.
5.	From the menu bar, select **Acquisition>Start Preview**.
6.	Select **Acquisition>Calibration**. Verify that there are sine wave calibration signals on all 16 traces.
7.	**Minimize** the *16 Channel Verification* window.

Sound Verification

Step	Action
1.	Click on the **Audio** icon to display the *Audio* and *Audio Channels* windows.
2.	On the Mini Control Panel, turn the **Volume** knob all the way counter-clockwise.
3.	In the *Audio Channels* window, place a **check mark** in any Channel box.
4.	Slowly turn the **Volume knob** on the Mini Control Panel until sound can be heard from the speaker.

Step	Action
5.	Press the **Mute** button on the Mini Control Panel and verify the Mute LED lights up and the sound is muted.
6.	Press the **Mute** button again and verify that the LED goes out and the sound returns.
7.	In the *Audio Channels* window, **uncheck** the active channel.
8.	Click on the **Audio** button to hide the Audio panels.

EEG Verification

Step	Action
1.	Click inside the EEG panel to select it.
2.	If waveforms are not active in the EEG window, click on the **Start Preview** button, or select **Acquisition>Start Preview** from the menu bar.
3.	Verify that there are signals moving on each of the two channels in this panel.
4.	Click on the **Stop Preview** button, or select **Acquisition>Stop Preview**.

Electrical Stim Verification

Step	Action
1.	Connect a bar electrode to **position 1** of the **SP-1** Stimulator Pod.
2.	Click on **View> Global Parameters> Hardware** and verify the Portable Stimulator is selected. **Close** the *Global Application Parameters* window.
3.	Click inside the **Electrical panel** to select it.
4.	Adjust all four of the Control Panel **Stimulus Intensity** knobs fully counterclockwise (for zero output).
5.	Click on the **Start Preview** button.
6.	Click on **Start Average** button.

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Step	Action
7.	Verify that there are signals moving on each channel in the Electrical Panel, and averaging is taking place.
8.	Place the bar electrode on your wrist or over the thumb muscle. Carefully adjust the **Stimulus Intensity 1** knob until you feel the stimulus, then readjust the output to zero.
9.	Move the bar electrode to **position 4** of the **SP-1** Stimulator Pod. If necessary, click on the **Start Average** button to continue averaging. Carefully adjust the **Stimulus Intensity 2** knob until you feel the stimulus, then readjust the output to zero.
10.	Move the bar electrode to **position 7** of the **SP-2** Stimulator Pod. If necessary, click on the **Start Average** button to continue averaging. Carefully adjust the **Stimulus Intensity 2** knob until you feel the stimulus, then readjust the output to zero.
11.	Move the bar electrode to **position 10** of the **SP-2** Stimulator Pod. If necessary, click on the **Start Average** button to continue averaging. Carefully adjust the **Stimulus Intensity 2** knob until you feel the stimulus, then readjust the output to zero.
12.	Click on the **Stop Preview** button and disconnect the electrodes.

Auditory Stim Verification

Step	Action
1.	Verify that the headphones are plugged in.
2.	Click inside the **Auditory panel** to select it.
3.	Click on the **Auditory** button to display the *Auditory* window. Set the *Left* and *Right* intensities to **65dB**.
4.	Click on the **Start Preview** button.
5.	Click on **Start Average** button.
6.	Verify you can hear a click stimulus in both ears.
7.	Click on the **Stop Preview** button.

Visual Stim Verification

Step	Action
1.	Click inside the **Visual** panel to select it.
2.	Click on the **Start Preview** button.
3.	Click on the **Start Average** button.
4.	Verify the goggles flash in accordance with the screen display choices.
5.	Click on **Stop Preview**.

HTML Report Generation

Step	Action
1.	From the menu bar, select **File > Report > Generation to Html**.
2.	Highlight the **Endeavor_Default_Portrait.set** file.
3.	Click on **Open**.
4.	Verify that the selected Endeavor report opens in Microsoft Internet Explorer.
5.	Exit Internet Explorer.

Microsoft Word Report Generation

Step	Action
1.	Click on **File > Report > Generation to Word**.
2.	Highlight the **Endeavor_Default_Portrait.set** file.
3.	Click on **Open**.
4.	Verify that the selected Endeavor report opens in Microsoft Word.

Report Printing

Step	Action
1.	With the report displayed in Word, click on **File > Print**.
2.	Click on **OK**.
3.	Verify that the selected Endeavor report prints.
4.	**Exit** Word.
5.	**Exit** Endeavor. Do not save changes when prompted.

Report Deletion

Step	Action
1.	Reports made during this installation can be deleted by going into Windows Explorer and finding the recorded data file in the C:\Nicolet\Endeavor\Data folder.
2.	To delete a file, highlight the data file and then press the **Delete** key on the keyboard.
3.	Any files that have been deleted during this installation should also be deleted from the Recycle bin.

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Routine Backup and Maintenance Procedures

This section describes the backup and maintenance procedures routinely performed by instrument operators and hospital service personnel.

The chart below defines the scenarios where a specific procedure is necessary.

Operator Responsibilities

The system user is responsible for performing the following set of procedures on a scheduled basis. Following this schedule ensures successful day-to-day functioning of the instrument.

All customers who attend VIASYS Neurocare EEG instrument training are taught these procedures.

Service Responsibilities

Before starting a software installation, update, or repair, you are responsible for making sure the customer has archived any patient files and has backed up the database. If you are unsure of the database backup status, you may need to perform this procedure yourself.

Item	Procedure	Schedule
1.	Check Hard Disk Space	Daily
2.	Archive Patient Data	Weekly, or more often, based on the amount of hard drive space.
3.	Run Database Checks and Backup the Database	Weekly
4.	Run Disk Cleanup and Defragment the Hard Drive	Bi-Weekly or Monthly
5.	Back up Unique System Settings Files	After you create or modify any application settings files, such as montage files.

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Backup Procedure

Check Hard Disk Space

System users generally watch hard disk space as a normal part of their working routine. While acquiring data, the amount of disk space left is shown indirectly by the "amount of time left" window at the bottom left side of the acquisition screen.

- For clinical instruments, make sure there are more than four hours of recording time left on the hard drive.
- For long-term monitoring, make sure there are more than 24 hours of recording time left.

The following procedure shows how to view disk space directly on the C: drive.

Step	Action
1.	Double click on **My Computer**.
2.	In the My Computer window, right click on the **C:** icon and select **Properties** from the drop-down menu.
3.	In the **General** tab, verify there is sufficient disk space available to store test data. If the disk is more than half full, consider archiving any patient data files to make more space available.
4.	When you are finished, Click on **OK** to close the *Properties* window.
5.	If the system contains two hard drives, repeat steps 2-4 for the D: drive.
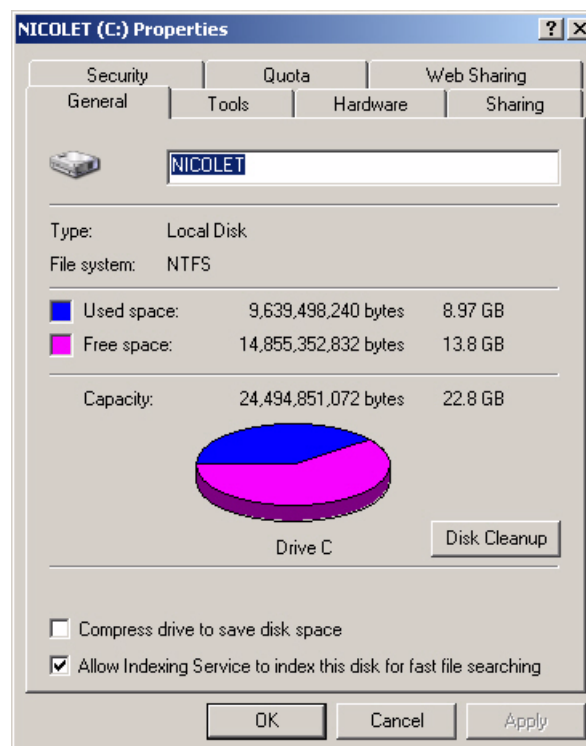
Archive Patient Data

This step is routinely performed by the system operators on a scheduled basis, since they have a highly vested interest in maintaining patient records and data.

Verify this procedure has been completed prior to any service work on the system.

The procedure for archiving patient exams depends on whether you are using NicVue, and which version of NicVue is installed. For systems without NicVue, patient data and customer settings files are typically archived from within Windows XP, or by a third-party package such as Easy CD Creator or Direct CD.

Refer to the specific system's User Guide, or On-line Help for specific archiving instructions.

Disk Cleanup and Defragment the Hard Drive

Defragment the hard drive(s) as part of your preventive maintenance program, after archiving files to CD, or when normal system operation appears to slow down.

Customers are taught to defrag the hard drives as part of scheduled system maintenance. This process may take a significant amount of time (hours). Defragmenting may be done unattended when the instrument is not in use.

Before defragmenting a hard drive, it is desirable to clean up any temporary files. Windows XP provides a Disk Cleanup utility specifically for this purpose.

Step	Action
1.	With all applications closed, click on **Start> All Programs> Accessories> System Tools> Disk Cleanup**. A *Select Drive* window opens, instructing you to select the drive you wish to clean.
2.	Select the **C:** drive and click on **OK**. The *Disk Cleanup* window opens, showing you the categories of files you may delete.
3.	Accept the default settings, or highlight and review each item in the *Files to delete* list to decide which categories to delete. Click on **OK**. A query window opens asking "*Are you sure...?*"
4.	Click on **Yes**. A status window opens to show the progress of the disk cleanup, and closes when the process is finished.
5.	Click on **Start> All Programs> Accessories> System Tools> Disk Defragmenter**.
6.	In the panel showing the local hard drives, highlight the drive you wish to defragment.
7.	Click on **Analyze** to have the utility recommend further action.
8.	Click on **Close** to close the Disk Defragmenter report window.

Step	Action
9.	If the disk analysis shows numerous fragmented files, click on **Defragment** to start the defragmentation process. You may want to start this process when you know the instrument will not be in use for a while.
10.	When the defrag process completes, an information window opens. Click on **Close**.
11.	Repeat steps 2-10 for the D:\drive, if present.
12.	Close the *Disk Defragmenter* window.
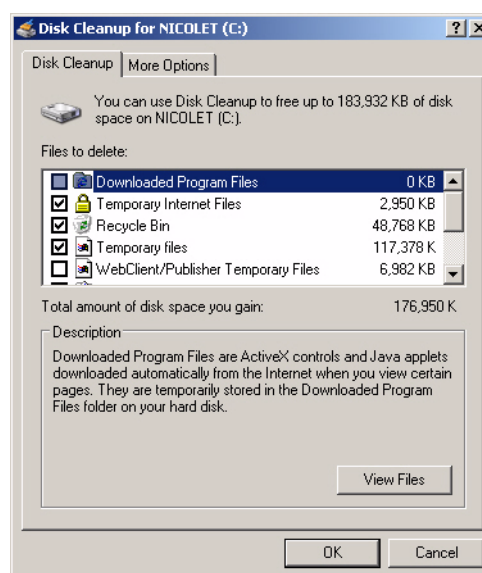
Disk Cleanup Window: Step 3
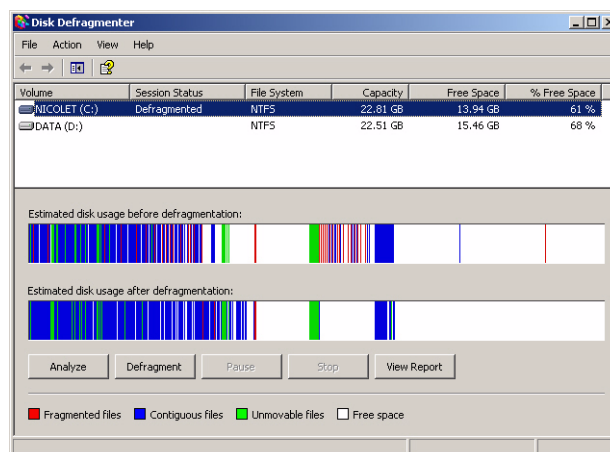
Defragment the Hard Drive: Step 9

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Tips for Defragmenting

- Defragmentation requires at least 15% free space on a volume to run successfully. Before defragmenting a volume, delete any unnecessary files, such as temporary files.
- Defragment a volume after you have archived patient data to CD, and deleted the data from hard drive.
- For long-term studies, defragment the hard drive before you run a new patient.
- Defragment during periods of low system activity.

Backup Network Settings

This procedure creates a text file (ipinfo.txt) in the C:\Nicolet\Npa folder, which contains the system name, IP address and other pertinent information for setting up the network

Step	Action
1.	Click on **Start>Run**. The Run window opens.
2.	In the *Run* window, type: **cmd** to open the *Command Prompt* window.
3.	In the *Command Prompt* window, type the following command on a **single line** with **no spaces**: `ipconfig /all> c:\nicolet\npa\ipinfo.txt` The system creates the text file ipinfo.txt
4.	Print the file or copy to archive media.

Backup the Database and Run Database Checks (NicVue)

System operators are trained by Nicolet to back up the database on a scheduled basis as part of their routine maintenance procedure. Verify a recent backup has been done, or perform this procedure before starting any service work on the system.

Step	Action
1.	From NicVue's main screen, click on **Tools>Database>Utilities**. A login screen opens.
2.	Enter the password (**nicolet**) and click on **OK**. The *Database Utilities* screen opens.
3.	Click on **Backup Database**. An alert window opens, asking you to make sure the database is not in use. Click on **OK** to close the caution window. The *Select a destination* window opens.
4.	In the *Save in* window, select the destination for the backup file. The database backup folder on the C: drive is *C:\Nicolet\Npa*.
5.	In the *File name* window, type in the **name** for the backup file. We recommend you use the date as a file name (e.g., Sept 3 2004).
6.	Click on **Save**. After the backup completes, the system displays an *Operation completed* confirmation window.
7.	Click on **OK** to close the confirmation window.
8.	Click on the **Database Checks** tab to bring it to the front position.
9.	In the *Database Checks* panel, verify all three check boxes contain check marks. Click on **Check Database**. An *Alert* window opens asking you to verify the database is not in use.

Step	Action
10.	Click on **OK** to close the *Alert* window. NicVue automatically fixes any instances of duplicate or unlinked records and displays a *Results* window. **Note:** Duplicate or unlinked records may result from merging databases, or from someone making changes to the database outside of NicVue.
11.	Click on **Close** to close the *Results* window.
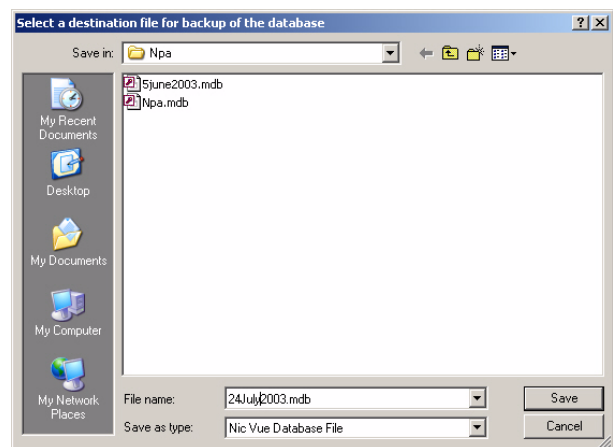
Backup the Database: Steps 4-5
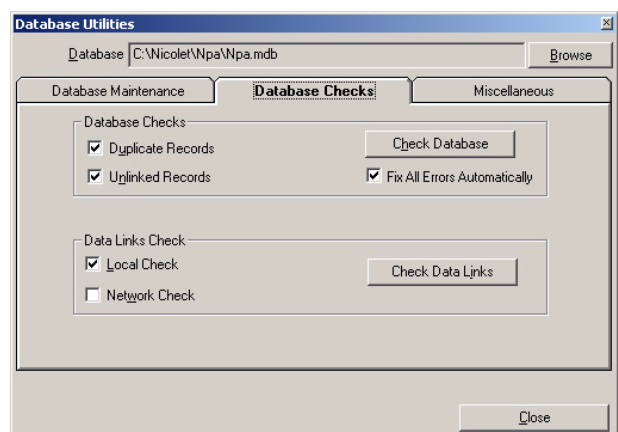
Database Checks: Steps 8-10

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Step	Action
12.	Click on the **Database Maintenance** tab to bring it to the front. Verify the main database appears in the *Database* window. Make sure the check box labeled *Compact database before backup* contains a check mark. This ensures that the database is compacted automatically prior to a backup.
13.	Click on **Close** to close the *Database Utilities* window.
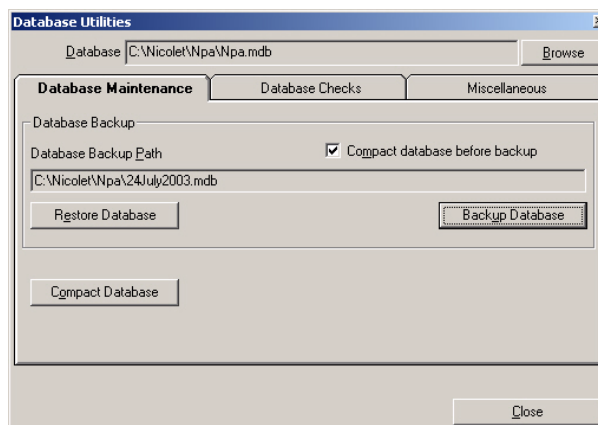
Backup the Database: Step 12

Backup the DCM Registry (NicVue)

Backup the DCM registry prior to doing any service work on the system.

The DCM (Device Configuration Manager) registry is NicVue's list of devices and path names for managing data files. Locate the DCM registry file (dcm.reg) or DCM registry backup file (mmddyy.reg), where mmddyy represent the date of backup. These files typically reside in C:\Nicolet\Npa.

If necessary, locate the DCM backup file by conducting a search for *.reg from within the Windows NT Explorer.

If the DCM registry has not been backed up recently, do it yourself using the directions that follow.

Step	Action
1.	Open the NicVue program.
2.	Click on **Tools/System Setup**. A *Login* window opens.
3.	Type **nicolet** for the password, then click on **OK**. The *System Setup* window opens.
4.	From the **Miscellaneous** (or **Utilities)** tab, click on the **DCM** button. The *Device Configuration Manager* window opens.
5.	Click on the **Registry** button, then click on **Save Registry** from the drop-down menu. A *Save As* window opens.
6.	Click on the **Down Arrow button** to the right of the *Save in:* window and verify the *Save in:* destination path is **C:\Nicolet\Npa**. The Npa folder appears in the *Save in:* window.
7.	Name the backup file using the current date (*mmddyy*.reg or *ddmmyy*.reg) and click on **Save**. The system writes the *.reg* file to the selected path, then closes the *Save As* window.
8.	Click on **Cancel** to close the *Device Configuration Manager* window.
9.	Click on **OK** to close the *System Setup-Utilities* window.
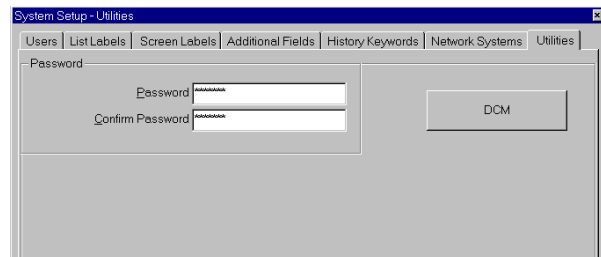
Backup the NicVue DCM Registry: Step 4.
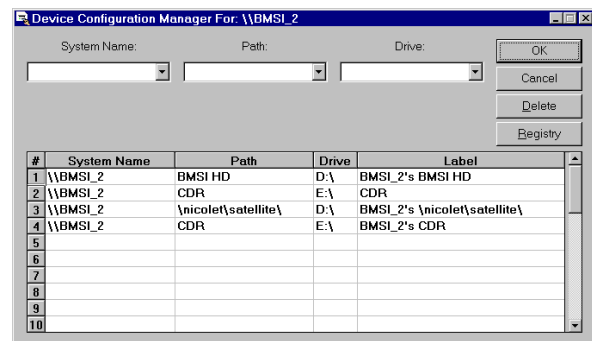
Backup the NicVue DCM Registry: Step 5.
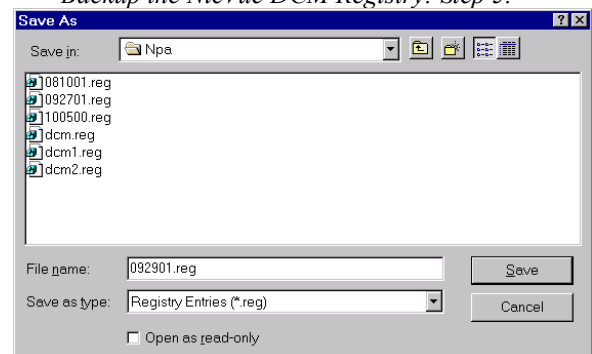
Backup the NicVue DCM Registry: Steps 6-9.

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Archive to CD (NicVue)

Use this procedure to back up the contents of the C:\Nicolet\Npa folder to CD. This folder contains the database backup file, network settings text file, dcm registry file and other important NicVue-related files that you may need in case of an emergency.

Step	Action
1.	Double click on **My Computer**.
2.	Double click on the **C: drive** icon.
3.	Double click on the **Nicolet** folder.
4.	Right click on the **Npa** folder. and select **Send to CD Drive**.
5.	Click on the balloon titled **You have files waiting to be written to CD**.
6.	Select **File>Write these files to CD**.
7.	From the *Welcome to the CD Writing Wizard* window, click on **Next**. The system writes the selected files to CD and displays a completion window.
8.	From the *Completing the CD Writing Wizard* window, click on **Finish**.
9.	Close any open windows.

System Software Loading Summary

Introduction

The following sections cover the steps required to install system software on an Endeavor CR, VikingQuest and VikingSelect.

Caution:
Please read this entire summary before you attempt to load software. You assume all risks and liabilities when you perform a full software load. You may be subject to service charges to restore the system to normal operation, even if the system is within the Warranty period or under Service Contract.

Software installation is a multi-stage process that must be done in proper sequence. The following chart summarizes the software loading sequence for each instrument. We suggest you use this chart as a checklist when performing any software installation to avoid mistakes.

Backup

Each system has unique settings and customer files that will be lost if you have to perform a full system load. Be sure to backup or otherwise preserve this information before loading any software.

Procedure	Endeavor CR	VikingQuest	VikingSelect
Backup all system-unique settings files; locate essential system information	X	X	X
Set up Windows XP Display & Desktop Properties	X	X	X
Load Network Drivers	X	X	X
Load Print Drivers	X	X	X
Set Up CD Writer Application	X	X	X
Load MS Office (for MSW Report)	N/A	Option	Option
Load & License NicVue Software (Option)	Option	Option	Option
Load & Configure Application Software (ECR, VQ or VS)	ECR	VQ	VS
Load USB Drivers	X	X	N/A
Check Nicolet Folder Sharing			

Set up Windows XP Properties

These settings must be adjusted so as not to interfere with ongoing data acquisition.

Load Network Driver

Load Printer Drivers

VIASYS provides optimized printer drivers that are designed to work well with the VIASYS applications.

Load and set up CD-writer application

The archiving utility to be used depends on whether or not NicVue is installed.

Load, configure and license NicVue software (Option)

The NicVue patient administrator is an option for managing a database of patient information and for keeping track of patient data locations. This program must be loaded before the other VIASYS applications.

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Load and configure application software

This software is used for acquiring and reviewing patient data.

Load MS Office

Microsoft Word is required for generating reports on the VikingQuest and VikingSelect applications.

Check folder sharing

Folder sharing is required for networked systems.

Items Required

The following items are required for a complete software installation:

- Windows 2000/XP Drivers CD (482-636203)
- System Serial Number (attached to the computer case)
- The System Name and Workgroup
- Network IP address setup for the system
- Customer Data and Settings backups
- NicVue Installation CD
- Endeavor CR, VikingQuest, or VikingSelect Installation CDs

Windows Configuration

If you are going to load VIASYS software on a new computer that has been pre-loaded with Windows XP by the manufacturer, follow these steps.

Some of the following steps pertain directly to the Dell Latitude D505 laptop computer. If you are loading software on a different computer, some of the configuration steps may differ.

Step	Action
1.	Power up the system. At the *Welcome to Microsoft Windows* screen, click on **Next** to continue.
2.	At the EULA screen, select **Yes, I accept it** and click on **Next**.
3.	For the *Computer Name* on the next screen, enter **EndeavorUser** (no spaces) or **VikingUser** (no spaces) and click on **Next**.
4.	When asked for the Administrator password, enter **nicolet**, confirm the entry, and click on **Next**.
5.	If the message *An internet connection could not be ...* appears, click on **Skip**.
6.	If the message *How will this computer connect...* appears, select **Local area network (LAN)** and click on **Next**.
7.	At the *Setting up a high speed connection* screen, check mark **Obtain IP automatically** and **Obtain DNS automatically**, then click on **Next**.
8.	If asked to register with Dell or Microsoft, select **No, not at this time** and click on **Next**.
9.	At the *Who will use this computer* screen, enter **Nicolet** in the *Your Name* field, then click on **Next**.
10.	Click on **Finish**.

Set Up Windows XP Display & Desktop Properties

The Windows 2000/XP Drivers & Settings CD, P/N 482-6362xx contains the following files:

- a settings file used to switch Windows XP into Classic View mode (The only VIASYS-supported interface). It removes unnecessary icons from the desktop as well.

- Windows 2000 and Windows XP device drivers for network, graphics and sound cards supported by VIASYS.

- a version of Roxio Easy CD Creator/Direct CD

NOTE:

We recommend installing the CD writer application from the OEM-supplied disk. The software drivers on driver disk can quickly become out of date for the current CD writer drives.

Set the Classic View Mode

Step	Action
1.	Insert the Windows 2000/XP Drivers CD into the system CD drive. The CD should auto-play
2.	When the CD auto-play completes, scroll to the bottom of the Action menu and select **Take no action**. Place a **check mark** in the box labeled *Always do the selected action* and click **OK**. **NOTE:** If you see the message *Take a tour of Windows XP*, close the dialog box.
3.	Click on **Start >All Programs >Accessories>System Tools >Files and Settings Transfer Wizard**.
4.	On the *Files and Settings Transfer Wizard* window, click on **Next**.
5.	At the *Which computer is this?* screen, select **New computer** and click on **Next**.

Step	Action
6.	At the *Do you have a Windows XP CD?* screen, select **I don't need the Wizard Disk. I have already collected my files and settings from my old computer** and click on **Next**.
7.	At the *Where are the files and settings?* screen, select **Other**. Click the **Browse** button.
8.	In the *Browse For Folder* window, click on the plus sign **(+)** to the left of *My Computer*.
9.	Click on the plus sign **(+)** to the left of the CD drive letter to display the contents of the Settings CD.
10.	Click on the plus sign **(+)** to the left of the *Settings* folder.
11.	Highlight the **USMT2.UNC** folder. and click on **OK**. The path for the USMT2.UNC file appears in the *Files and Settings Transfer Wizard* window.
12.	Click on **Next**. A progress screen shows the file transfer progress.
13.	Click **Finish** to close the *File and Settings Transfer Wizard* window.
14.	A notification window opens, asking you to logoff. Click **Yes** to log off the system and have the changes take affect.
15.	Log back onto the system, and remove the Windows 2000/XP Drivers CD from the CD drive.

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Check Display Settings

Step	Action
16.	Right click on any open area of the desktop. A menu opens.
17.	Click on **Properties**. The *Display Properties* window opens.
18.	On the *Settings* tab, verify: Screen Resolution = **1280x1024** or **1024x768** (15" LCD panels only) Color Quality = **Medium (16 bit)**
19.	Optional: To set the desktop wallpaper to the VIASYS logo, click on the **Desktop** tab, then click on **NicPaper**.
20.	Click on **Apply** to apply the new display settings.
21.	Click on **Yes** to close the confirmation window.
22.	Click on **OK** to close the *Display Properties* window.

Load the Network Driver

Step	Action
23.	On the Windows desktop, click on **Start>Settings>Control Panel**.
24.	On the Control Panel window, click on the **Add Hardware** icon. The *Add Hardware Wizard* opens.
25.	On the *Welcome* screen, click on **Next**. The Hardware Wizard checks for components.
26.	When you see the message, *Is the hardware connected?*, click on **Yes, I have already connected the hardware**, then click on **Next**.
27.	On the list of hardware already installed, highlight **Ethernet Controller**. You should see a yellow exclamation point in front of this option. This icon means that the driver is not installed for this device. Click on **Next**.
28.	On the *Completing the Add Hardware Wizard* screen, click on **Finish**.
29.	When you see the message, *If your hardware came with an installation CD or floppy disk, insert it now*, insert the Network Drivers and Settings CD in the CD drive.
30.	Click on **Next**.
31.	On the *Completing the Hardware Update Wizard* window, click on **Finish**.
32.	As the driver is installed, you may see a message about the driver software not passing Windows Logo testing to verify compatibility, click on **Continue Anyway**.
33.	When you see the *Adaptor Software installation completed* message, click on **Finish**.
34.	When you see the *New network device installed* message, click on the **Network** icon to which the message points.
35.	On the *Network Connections* window, open the *Advanced* menu, then click on **Network Identification…**

Step	Action
36.	Click on the **Computer Name** tab, then click on **Change**. Change the Workgroup Name to **NICOLET**. Optional: You can change the computer name at this time, if necessary.
37.	Click on **OK** to.....
38.	Click on **OK** to respond to the *Welcome to the Nicolet Workgroup* message.
39.	Click on **OK** to respond to the *You must restart this computer for the changes to take effect* message.
40.	Click on **OK** to close the *System Properties* window.
41.	Click on **Yes** to *restart your computer now.*
42.	Remove the Network Driver and Settings CD from the CD drive. Store it in a safe place, with your other system software.
43.	On the Windows desktop, click on **Start>Settings>Control Panel**.
44.	On the *Control Panel* window, click on the **User Accounts** icon.
45.	On the *User Accounts* window, under the *Pick a task…*" heading, click on **Change the way users log on and off**.
46.	On the *Select logon and logoff options* panel, click on **Use the Welcome screen** option to deselect it. Deselecting this option also deselects *Use Fast User Switching* option
47.	Click on **Apply Options**.
48.	Close the *User Accounts* and *Control Panel* windows.
49.	Click on **Start>Turn Off Computer >Restart**.
50.	After the system reboots and you have logged on to Windows, verify that the system is functioning correctly. It is also recommended that you run check disk and defrag.

Install the CD Writer Application

We recommend that you to install the CD Writer application provided by the OEM with the computer (unless the CD Writer has been replaced with a newer model) to ensure compatibility with the CD writer drive.

Place the OEM provided CD Writer application CD in the CD ROM drive. The CD should autoplay and bring up an install screen.

Follow the prompts and use all of the default options. If the CD does not autoplay, Browse the CD for a Setup.exe or Install.exe file to activate the installation. You will also find a CD Writer application on the Nicolet 2000/XP Driver and Settings CD (Part number 482-63620X), in a folder called "CD."

Load MS Office (Option)

Step	Action
1.	Place the MS Office CD in the CD or DVD drive. The installation process will auto-start.
2.	Enter the license key number for the MS Office software when prompted.
3.	Enter **EndeavorUser** for the user name and click on **Next**.
4.	At the *Type of Install* screen, accept the default location. Click on the **Custom Install** icon, then click on **Next**.
5.	Select Word and Excel for loading, deselect Outlook. Click on **Next**.
6.	Verify that the *Summary* screen shows: *Word <Run from my computer>* *Excel <Run from my computer>* *Outlook <Not available>* and click on **Install**.
7.	At the *Setup Completed* screen, leave the default settings and click on **Finish**.

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Step	Action
8.	When loading has finished, Remove the *MS Office CD* from the drive and click on **Restart**.
9.	After rebooting, click on **Start>Programs>Microsoft Word**.
10.	At the *End User License Agreement* screen, click on **Accept**.
11.	Activate the software following the on-screen instructions.

Install NicVue (Option)

Step	Action
1.	Close any open applications. Insert the NicVue Installation CD into the CD or DVD drive. The CD auto-starts and displays the *NicVue - InstallShield Wizard* window.
2.	Click on **Next**. The *License Agreement* screen appears.
3.	Click on **Yes** to accept the license agreement. The NicVue software loads, then displays a *Setup Complete* window.
4.	Select **Yes, I want to restart my computer now** and then click on **Finish** to close the window.
5.	Remove the NicVue CD from the CD/DVD drive and store it in a safe location.

License the NicVue Application

After you have installed the NicVue application, it must be licensed for use. To successfully license your software, you will need to know the **Computer Key** number and the **Sales Order** number for your software purchase. The Computer Key number appears in the NicVue Licence Manager window the first time you attempt to open NicVue. The Sales Order Number appears on the Sales Order form that accompanied your software or instrument purchase.

If your system is connected to the internet, use the procedure below to register automatically. If you do not have internet access, or if internet registration fails, contact the VIASYS Technical Support Team at 1-800-356-0007. You may also send an email to madison.helpdesk@viasyshc.com. Be sure to include the Computer Key and Sales Order number for your system in your correspondence. Allow 24 hours for an email response.

Licensing via the Internet

Step	Action
1.	From the Windows Desktop, double-click on the **NicVue** icon. The *NicVue License Manager* screen appears.
2.	If you are connected to the internet, click on **Submit Registration Information Online**. The *VIASYS...Purchase Wizard* screen appears.
3.	Make sure you have your Sales Order number available, and click on **Next**. The *Serial number* screen appears.
4.	Enter your **Sales Order Number** in the *Serial number* window and click on **Next**. A *Customer information* screen appears.
5.	Fill in the fields marked with an asterisk (*), double-check the information you have entered for accuracy, then click on **Next**. A *Thank you* screen appears.
6.	Click on **Finish**. A *Registered Successfully!* window appears.
7.	Click on **OK**. A *Registration summary* screen appears, listing the software options you have licensed and their status.
8.	Click on **Done**. A *Licensing Information Detected* window opens.
9.	Click on **OK** to close the *Licensing Information* window. Nicvue proceeds to open normally.
10.	Close NicVue to proceed with the next steps.

Endeavor CR Software Loading Procedure

Introduction

This section covers the steps required to install the Endeavor CR application on the host computer. This procedure assumes that Windows XP is already resident on the computer.

Items Required

The following items are required for a complete software installation:

- Windows 2000/XP Drivers CD (482-636203)
- The System Name and Workgroup and Network IP address setup for the system
- Printer and accompanying USB cable
- NicVue and Endeavor CR Installation CDs

Before you install Endeavor CR software, **disconnect the computer from the Endeavor CR base unit** (required for Windows XP to properly detect the USB connection between the computer and base unit)

Procedure.

Step	Action
1.	Insert the Endeavor CR Installation CD into the CD or DVD drive. The CD auto-starts and displays the *InstallShield Wizard* window showing a *Select Hardware* screen.
2.	Select either the Desktop or Portable option then click on **Next**. A *Welcome* screen appears.
3.	Click on **Next**. The *Software License Agreement* screen appears.
4.	Click on **Yes** to accept the license agreement. A query panel asks if you wish to install Endeavor Review software.
5.	Select **YES or NO** and click on **Next**. The *Installing ...* screen appears with a status bar showing installation progress. When done, the *Install Wizard Complete* screen appears.
6.	Remove the Endeavor CR disk from the CD or DVD drive.
7.	Click on **Yes, I want to restart my computer**, then click on **Finish** to close the installation window, then reboot.

Load USB Drivers

Step	Action
1.	Plug in the USB interface cable from the base to the laptop.
2.	Click on **Next**. The system...
3.	Click on **Continue anyway**. The system...
4.	Click on **Browse**. Locate and highlight **C:\Windows\System32\Drivers\CyUSB**.
5.	Click on **Open** and **OK**.
6.	Click on **Finish**.
7.	Repeat steps 1 to 6 for all the remaining USB ports on the computer.

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VikingQuest Software Loading Procedure

Introduction

This section covers the steps required to install the VikingQuest Master Software and Licensed Applications on your VikingQuest system.

Items Required

The following items are required for a complete software installation:

• System Addendum CD)

• VikingQuest Software License Disk

This procedure may take up to 15 minutes to complete.

Tips on Performing this Procedure Successfully

1. If you see a message about a file not being found, make sure you have the correct disk inserted in the correct disk drive.

2. Be sure to click on buttons, such as **OK** and **Yes**, rather than just pressing **Enter**. The option you want may not be selected, even if it is the only option listed.

3. Always restart the system by clicking on **Start**, then selecting **Shut Down** and **Restart the computer** (**Start > Shut Down > Restart the computer**) unless instructed otherwise.

4. When you see the OS Loader screen after restarting the system, do not do anything. The system will display the Begin Logon window within a minute.

5. Install the software with the console base unplugged from the laptop or CPU.

6. Several new hardware devices may be found on start up. For each New Hardware Wizard dialog, click the on **Cancel** button when prompted.

Procedure

Step	Action
1.	Restart your VikingQuest (**Start > Shut Down > Restart the computer**), then log on as **Nicolet** (there is no password unless you set one)
2.	Insert the VikingQuest Addendum CD into the CD drive. The setup program should start up automatically. If it does not start, follow the steps below: a. Select **Start > Run**. b. On the *Run* box, type the **drive letter** for the CD drive. c. Click on the **Browse** button. d. Next, double click on the **setup.exe** folder and click on **OK**.
3.	Read the information given on the VikingQuest *Welcome* screen, then click on **Next**.
4.	Read the Software License Agreement, then click on **Yes**.
5.	On the *Installation Options* screen, click on the software options you want to install. You need to install the Master Software, the Licensed Software and Settings, if you do not have your own settings. The Demo Software and Demo Data choices are optional. **If you have customized settings previously installed on your system, do NOT check the Install Settings option.**
6.	When finished making selections, click on **Next**. The program prompts you for the Software License serial number.
7.	Insert the VikingQuest Software License disk into the floppy drive and click on **Next**.

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Step	Action
8.	Type the serial number listed on the floppy disk sleeve and click on **Next**. The program verifies that the license disk matches the system serial number.
9.	If you selected the *Install Demo Software* option on the *Installation Options* screen, you will select the demo software you want to install. If you have a license for an application, it will be grayed out. If you don't have a license for an application, you can place a **check mark** in front of the item to install the demo software. Or click on the **Select All** button to select all available applications, then click on **Next**.
10.	If you selected the *Install Settings* option on the *Installation Options* screen, you will select the settings to be installed. Click on the desired settings, then click on **Next**.
11.	Verify the information listed on the *Start Copying Files* box is correct, then click on **Start**. A series of installation and installation progress messages are displayed. **NOTE:** If VikingQuest program settings exist on the hard drive, you will see the *Overwrite Settings* message. If this is an *initial installation*, select **Yes** to overwrite the VikingQuest settings listed in the message, or select **Yes to All** to overwrite all VikingQuest settings stored on the hard drive. If *reloading*, select **No** to keep the original VikingQuest settings listed in the message, or select **No to All** to keep all existing settings and not overwrite them.

Step	Action
12.	When the VikingQuest installation is completed, the program displays the *Setup complete* window. Remove the VikingQuest Software License disk and the Addendum CD from the drives.
13.	Click on **Yes, I want to restart my computer now**, then click on **Finish**. The system restarts, then displays the *Begin Logon* box.
14.	Log on as normal.
15.	Be sure to store the installation disks in a safe place.

Reinstall The Console Base

Note: Verify that the console base is unplugged from the computer before you restart the computer.

Step	Action
1.	Restart your VikingQuest (**Start > Shut Down > Restart the computer**), then log on as Nicolet (there is no password unless you set one).
2.	If VikingQuest does not automatically start, go to step 3. If VikingQuest opens after logging on, click on **Cancel** in the *Hardware Initialization Failed* screen, and click on **OK** in the *Continue in Review Mode* screen. When VikingQuest opens, click on the **X** in the upper right corner to close the VikingQuest program.
3.	Plug the USB cable from the console base to the computer. A *Found New Hardware Wizard* window opens.
4.	Make sure the first option, *Install the software automatically (Recommended)* is marked.
5.	Insert the System Addendum CD into the CD drive and click on **Next**.
6.	On the *Windows Logo testing* window, click on **Continue Anyway**.
7.	When the wizard finishes searching for the driver, click on **Finish**.
8.	Leave the disk in the drive. If you are prompted with the *Found New Hardware* screen again, click on **Next** and repeat steps 6 and 7.
9.	Turn off the console base.
10.	Connect the console base to another USB port.
11.	Turn on the console base.
12.	Repeat steps 3 through 10 for any USB port that may be used. If the files are not found or you cannot find your Addendum CD, see the following section "Alternate USB Driver Installation."

Alternate USB Driver Installation

(Loading USB drivers when the VikingQuest Addendum CD is not available)

NOTE:

Install the VikingQuest software before installing the Console Base or other USB devices.

NOTE:

Verify that the console base is unplugged from the computer before you restart the computer.

Step	Action
1.	Restart your VikingQuest (**Start > Shut Down > Restart the computer**), then log on as Nicolet (there is no password unless you set one).
2.	If VikingQuest does not automatically start, go to step 3. If VikingQuest opens after logging on, click on **Cancel** in the *Hardware Initialization Failed* screen, and click on **OK** in the *Continue in Review Mode* screen. When VikingQuest opens, click on the **X** in the upper right corner to close the VikingQuest program.
3.	Plug the USB cable from the console base to the computer. A *Found New Hardware Wizard* window opens.
4.	Make sure the first option, *Install the software automatically (Recommended)* is marked.
5.	Click on **Next**.
6.	On the *Windows Logo testing* window, click on **Continue Anyway**.
7.	At the *Insert Disk* screen, click on **OK** without inserting the CD. (If you have the Addendum CD, see the directions in the previous section.)
8.	On the *Files Needed* window, click on **Browse**.

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Step	Action
9.	In the Browser window, select **WINDOWS > SYSTEM32 > DRIVERS > CyUSB.sys** then click on **OK**. The *Files Needed* window appears again.
10.	Click on **OK**.
11.	The *Files Needed* window will open again for the Quest.spt file path.
12.	Browse to **WINDOWS > SYSTEM32 > Quest > Quest.spt.** Then click on **OK**. The *Files Needed* window appears again.
13.	Click on **OK**.
14.	Click on **Finish**.
15.	Turn off the console base.
16.	Connect the console base to another USB port.
17.	Turn on the console base.
18.	Repeat steps 3 through 17 for any USB port that may be used.

VikingSelect Software Loading Procedure

Introduction

This section covers the steps required to install the VikingSelect Master Software and Licensed Applications on your VikingSelect system.

Items Required

The following items are required for a complete software installation:

- System Addendum CD)
- VikingSelect Software License Disk

This procedure may take up to 15 minutes to complete.

Tips on Performing this Procedure Successfully

1. If you see a message about a file not being found, make sure you have the correct disk inserted in the correct disk drive.

2. Be sure to click on buttons, such as **OK** and **Yes**, rather than just pressing **Enter**. The option you want may not be selected, even if it is the only option listed.

3. Always restart the system by clicking on **Start**, then selecting **Shut Down** and **Restart the computer** (**Start > Shut Down > Restart the computer**) unless instructed otherwise.

4. When you see the OS Loader screen after restarting the system, do not do anything. The system will display the Begin Logon window within a minute.

5. Several new hardware devices may be found on start up. For each New Hardware Wizard dialog, click the on **Cancel** button when prompted.

Procedure

Step	Action
1.	Restart your VikingSelect (**Start > Shut Down > Restart the computer**), then log on as **Nicolet** (there is no password unless you set one)
2.	Insert the VikingSelect Addendum CD into the CD drive. The setup program should start up automatically. If it does not start, follow the steps below: a. Select **Start > Run**. b. On the *Run* box, type the **drive letter** for the CD drive. c. Click on the **Browse** button. d. Next, double click on the **setup.exe** folder and click on **OK**.
3.	Read the information given on the VikingSelect *Welcome* screen, then click on **Next**.
4.	Read the Software License Agreement, then click on **Yes**.
5.	If you are installing the VikingSelect Program for the first time, select the type of system you have, then click on **Next**. If you are not sure of your system type, click on each name in the list, then read the description given below. Highlight the correct type, then click on **Next**. If you are reinstalling the VikingSelect Program (not the first installation), continue with Step 6.

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Step	Action
6.	On the *Installation Options* screen, click on the software options you want to install. You need to install the Master Software, the Licensed Software and Settings, if you do not have your own settings. The Demo Software and Demo Data choices are optional. **If you have customized settings previously installed on your system, do NOT check the Install Settings option.**
7.	When finished making selections, click on **Next**. The program prompts you for the Software License disk.
8.	Insert the VikingQuest Software License disk into the floppy drive and click on **Next**.
9.	On the *Software Registration* box, type the serial number listed on the floppy disk sleeve and click on **Next**. The program verifies that the license disk matches the system serial number.
10.	If you selected the *Install Demo Software* option on the *Installation Options* screen, you will select the demo software you want to install. If you have a license for an application, it will be grayed out. If you don't have a license for an application, you can place a **check mark** in front of the item to install the demo software. Or click on the **Select All** button to select all available applications, then click on **Next**.
11.	If you selected the *Install Settings* option on the *Installation Options* screen, you will select the settings to be installed. Click on the desired settings, then click on **Next**.

Step	Action
12.	Verify the information listed on the *Start Copying Files* box is correct, then click on **Start**. A series of installation and installation progress messages are displayed. **NOTE:** If VikingSelect program settings exist on the hard drive, you will see the *Overwrite Settings* message. If this is an ***initial installation***, select **Yes** to overwrite the VikingSelect settings listed in the message, or select **Yes to All** to overwrite all VikingSelect settings stored on the hard drive. If ***reloading***, select **No** to keep the original VikingSelect settings listed in the message, or select **No to All** to keep all existing settings and not overwrite them.
13.	When the VikingSelect installation is completed, the program displays the *Setup complete* window. Remove the VikingSelect Software License disk and the Addendum CD from the drives.
14.	Click on **Yes, I want to restart my computer now**, then click on **Finish**. The system restarts, then displays the *Begin Logon* box.
15.	Log on as normal.
16.	Be sure to store the installation disks in a safe place.

NicVue Setup Procedure

This procedure describes the steps required to set up a VIASYS-only network to run the NicVue patient administration database. This procedure assumes that you have already set up the Windows XP networking services and protocols described under *Software Loading Procedure* earlier in this chapter.

Set Up the Main Database (ReVue Station or Server)

NOTE:

Perform steps 1-8 ONLY on the system holding the Main Database. The Main Database typically resides on a ReVue station or Server. **Choose a system that will always remain ON**.

Step	Action
1.	From within NicVue, select **Tools/Database/Settings**. The password is **nicolet**.
2.	In the *Database Location* panel, verify the *Main database file* is where you want it on the local machine. The default location is **C:\Nicolet\Npa\Npa.mdb**. The important thing to remember is that the Main Database MUST reside in a shared folder for remote systems to connect to it.
3.	**Uncheck** the **Use Local Database File** selection.
4.	Complete the Main database settings by clicking **OK**.
5.	Open **My Computer** and browse to the *C:\Nicolet\Npa* folder.
6.	Verify that the main database (Npa.mdb) physically resides in this folder.
7.	To avoid confusion, delete the local database (NpaLocal.mdb) if it exists in the *C:\Nicolet\Npa* folder.
8.	Close the *My Computer* window.

Set Up the Databases (Acquisition Stations)

NOTE:

Perform steps 1-10 on ALL acquisition systems.

Step	Action
1.	From within NicVue, select **Tools/Database/Settings**. The password is **nicolet**.
2.	Each acquisition system requires a pointer to the Main Database on the ReVue system or Server. You can either type in the path if you know it (for example \\Review\Nicolet\Npa\Npa.mdb), or you can click the Browse button and find the file in My Network Places: a. In the *Database Location* panel, select the **Browse** button. b. Click on the drop-down button. ▼ to the right of the *Look-in* window. c. From the drop-down menu, double click on **My Network Places**. d. Double click on the main database system's *Computer Name*. e. Double click on **Npa**, highlight **Npa.mdb**, and select **Open**.
3.	In the *Database Location* panel, make sure the *Main database file* window specifies the selection you have just made.
4.	In the *Database Options* panel, make sure that the options **Use Local Database File** and **Update Local DB on exit** are both **checked**.
5.	The Local Database file should be listed as **C:\Nicolet\Npa\NpaLocal.mdb**.
6.	Click on **OK** to close the *Database Settings* window.

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Step	Action
7.	Open the *My Computer* window and browse to the local computer's *C:\Nicolet\Npa* folder.
8.	Verify that a local database file (NpaLocal.mdb) physically resides in this folder.
9.	To avoid confusion, delete the "main" database file on the local computer (Npa.mdb) if it exists in the *C:\Nicolet\Npa* folder.
10.	Close the *My Computer* window.

Verify the Device Configuration Manager (DCM) Settings (All Stations)

The Device Configuration Manager settings tell Nicvue where data and reports are stored on the local hard drive, and also point to the local CD or DVD writer for archiving purposes. The DCM settings are unique for each station, and must be verified or, in some cases changed.

Systems require a minimum of three DCM entries: the local data storage location, the local report storage location, and the local CDR or DVD drive.

NOTE:

Each acquisition or review program loaded onto a system requires data and report entries in the DCM list.

Step	Action
1.	From within NicVue, select **Tools/System Setup**. The password is **nicolet**.
2.	From the **Miscellaneous** tab, select **DCM**.
3.	If the Computer name has changed, make the necessary changes to the System Name of the DCM window. This will reassign the Label so that it functions correctly.

Step	Action
4.	There should be DCM entries for the local data and report storage paths on the C:\ or D:\ drive, and a selection for the CD or DVD drive. Unless data will be stored directly to a remote server, these are the only three selections that are needed. **NOTE:** **A CD or DVD must be present in the archive media drive to exit and save properly. Otherwise, the CD or DVD drive is not recognized.**
5.	If data is going to be stored directly to the Server, add a selection for the server. The entry will look like: Host = \\Server Name = \\SharePath and No drive letter. Because the server will not automatically have a path set up for the VIASYS applications, you may need to create a directory and share path. We recommend that you use the same share structure that was set up on the Acquisition systems (\Nicolet as the share folder and the necessary folders under that, for example, \EEG, \LTM, \NPA, \VikDir).
6.	Click on the **Network Systems** tab.
7.	Click the **Add New** button. The *Browse for computers* window appears.
8.	Left click on the **plus sign** next to *Entire Network*.
9.	Left click on the **plus sign** next to *Microsoft Windows Network*.
10.	Left click on the **plus sign** next to *Nicolet Workgroup*.
11.	Highlight the system you wish to add and click on **OK**.
12.	Click on **OK** to accept the changes and exit.
13.	Repeat steps 7-11 for each system you wish to add.

Enable the System View

Step	Action
14.	To view the Networked Systems area on the NicVue screen, select **View/Select Screen Mode /System**.
15.	Resize your screen areas appropriately.
16.	Repeat steps 12 and 13 for all systems.

Set Regional Preferences

17.	Select **Tools/Options**.
18.	Verify that the settings are correct for your location, and the appropriate Exam types are available for scheduling.
19.	Click **OK** to save.

Test the Setup

20.	Add a new patient and run a test as detailed in the System Verification Procedure detailed earlier in this chapter.

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Windows XP Repair Procedures

Introduction

This section contains two procedures for restoring the Windows XP operating system to working condition:

- System Restore
- System Repair

Due to the licensing requirements of Windows XP, VIASYS no longer provides an Image Disk to restore system software, as we did with our Windows NT-based products. Therefore, it is more advantageous to try a software repair, rather than a complete reload of the operating system and device drivers. Except for physical hard drive failures, you should never have to perform a complete software reload. The software restore procedure you use should be appropriate for the symptom.

System Restore

The System Restore utility allows you to roll back the system files to a point before a problem occurred. Restore points are created every time you load an application in Windows XP and can be created manually as well. Use this utility when:

- Installing a new application causes a problem
- Updating a program or device driver causes a problem
- Downloading a program or control from a website causes a problem.
- You are unable to diagnose a problem, but know approximately when the problem started

.

Step	Action
1.	Click on **Start>Help and Support**.
2.	From the *Pick a task* heading, click on **Undo changes to your computer with System Restore**.
3.	From the *Welcome to System Restore* screen, click on **Restore my computer to an earlier time**, then click on **Next**.
4.	Choose the appropriate Restore Point from the calendar on the *Select a Restore Point* screen, then click on **Next**.
5.	Click **Next** at the *Confirm Restore Point Selection* screen. A progress window opens. When the restore process completes, the system reboots and reverts back to the selected restore date.
6.	Log back into Windows.
7.	On reboot, a *Restoration Complete* window appears. Click **OK** to close the window.

NOTE:
To reverse the System Restore process, repeat steps 1 through 5 above, and select **Undo my last restoration** in step 3.

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Repairing Windows XP

Use this repair procedure if you suspect that a Windows XP system file has been corrupted, and you cannot resolve the problem by running Disk Check or by using System Restore. The advantage of repairing, as opposed to reloading Windows XP, is that a repair only affects the operating system files, and not the applications and additional device drivers. This procedure takes about 40 minutes to complete.

Step	Action
1.	Open the CD drive and insert the Omni Tech Product Recovery CD. Leave the drive open to prevent autoloading of the CD.
2.	Click on **Start>Shut Down or Turn Off Computer**. In the *Turn off computer* window, select **Restart** from the drop-down menu. The CD drive tray closes automatically as the system reboots. If not, close the drive tray manually.
3.	After the system locates a bootable CD in the drive, it displays the prompt: *Loading OS from CDROM drive...* *Press any key to boot from CD.* Press the **Space Bar** to boot from CD. The system displays: *Setup is inspecting your computer's hardware* and starts loading files from a blue text screen. **Note:** If you do not press the space bar, the system boots to the hard drive, if available and functional. If you cannot boot from CD, you may have to change the device boot order in BIOS so that the system looks for the CD drive before booting from the system hard drive. Press **F2** when prompted at bootup to enter the CMOS (BIOS) Setup program.
4.	At the *Welcome to Setup* screen, press **Enter** to set up Windows XP now. DO NOT select the repair option listed here - this option requires a repair floppy disk and does not accomplish much.

Step	Action
5.	Press **F8** to agree to the license terms.
6.	Press **R** to repair Windows XP. The system copies some files, reboots to a Windows XP screen, and displays a series of informational screens while it copies more files This entire process takes about 20 minutes to complete
7.	At the *Regional and Language Options* screen, click **Next**.
8.	Enter the **Windows XP Product Key**. The Product Key label is normally located on the right side of the computer box. Click **Next**.
9.	At the *Workgroup or Computer Domain* screen, click on **Next**. If you know the Workgroup or Computer Domain, you can enter the information. If not, you can enter this information later. The system copies more files and configures the system while displaying a series of informational screens. This process takes about 30 minutes to complete. When finished, the system reboots.
10.	At the *Welcome to Microsoft Windows* screen, click **Next**.
11.	At the *Ready to activate Windows?* screen, select **No, remind me every few days** and click **Next**.
12.	At the *Thank You* screen, click on **Finish**. The system boots to the Windows XP desktop.
13.	Remove the Product Recovery CD from the CD drive and store it in a safe place with the rest of the system software.
14.	Log back onto the system.
15.	Run **Disk Cleanup** and **Defrag** to optimize disk access speed.
16.	Ask the end user to verify correct system operation by running through the normal system procedures using a test patient.

Windows XP Loading Procedure

Introduction

If the System Restore and Windows XP Repair procedures did not correct the existing software issue, try reloading Windows XP.

CAUTION

Reloading Windows XP will delete all information stored on the hard drive, including all applications, settings and patient data files.

Before you begin this procedure, be sure to back up all patient data and settings files.

The software reload procedure for Windows XP-based systems are significantly different from the procedures for NT-based systems. This is due in part to Microsoft's Product Activation policy for Windows XP.

The computers that VIASYS uses for its products come preloaded with a version of Windows XP that is different from the version sold in retail outlets. This OEM (Original Equipment Manufacturer) version of Windows XP is locked to the BIOS information of the OEM motherboard, rather than to a unique installation number based on computer configuration.

The advantage of this approach is that expansion cards can be replaced, upgraded or added without de-activating Windows XP. As long as XP sees the original BIOS, it stays active. Even the motherboard can be replaced, as long as the replacement motherboard is manufactured by the OEM and retains the same BIOS. In the unlikely scenario that the BIOS information does not match, the PC would need to be activated within 30 days by contacting the Microsoft activation center via the Internet or telephone call - just as in a retail scenario.

Items Required

The following items are required to load and configure Windows XP:

- Windows XP Professional OEM Recovery Disk
- Windows XP software license number (attached to the computer case)
- Windows 2000/XP Drivers CD (482-636203)
- The System Name and Workgroup
- Network IP address setup for the system
- Customer Data and Settings backups

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Load Windows XP Professional (Existing Hard Drive)

This procedure is written specifically for the Omni Tech Halyron desktop computer with an Intel D865GLC motherboard. If you are loading Windows XP on another model of computer, please follow the manufacturer's instructions.

This procedure takes approximately 30-45 minutes to complete.

If you loading Windows XP on a new, replacement hard drive, skip to the next section.

⚠️ CAUTION ——————————

Reloading Windows XP will delete all information stored on the hard drive, including all applications, settings and patient data files.

Before you begin this procedure, be sure to back up all patient data and settings files.

.

Step	Action
1.	Insert the Omni-Tech Product Recovery CD into the CD drive. If the Recovery CD auto-plays, click on **Cancel** to exit the window that is displayed.
2.	Click on **Start>Turn Off Computer>Restart**.
3.	When you see the message *Press Any Key to Boot from CD* at the bottom of the screen, press the **Space bar**. The system setup loads the appropriate files. If the system boots to the hard drive, you will need to reboot and try again.
4.	At the *Welcome to Setup* screen, press **Enter** to set up Windows XP now.
5.	Press **F8** to agree to the license terms.
6.	Highlight **C: Partition (NTFS)**, if necessary, and press **Esc** to continue installing a fresh copy of Windows XP without repairing.

Step	Action
7.	Highlight **C: Partition (NTFS)**, if necessary, and press **Enter** to set up Windows XP on the selected item. **NOTE:** At this point, you can delete unwanted partitions, if necessary.
8.	Type **C** to continue Setup using this partition.
9.	Press **Enter** to select *Leave the current file system intact (no changes)*.
10.	Press **L** to use the folder and delete the existing Windows installation in it. Existing system files are deleted and new system files are copied to the hard drive. The system reboots, then begins installing Windows. The amount of time remaining to complete this step is displayed on the left side of the screen.
11.	At the *Regional and Language Options* screen, click on **Next**.
12.	At the *Personalize Your Software* screen, enter the **facility name** in the *Name* field and click on **Next**.
13.	Enter the **Windows XP Product Key**. The Product Key label is normally located on the right side of the computer case. Click on **Next**.
14.	At the *Computer Name and Administrator Password* screen, enter the correct **Computer Name**. If you are not sure of the name, you can change it later in this procedure.
15.	Type a password of **nicolet**. Type **nicolet** again to confirm the password and click on **Next**.
16.	Adjust the **Date**, **Time and Time Zone** settings, if necessary, then click on **Next**. The system copies files to the hard drive and configures the system while displaying a series of informational screens. This process takes about 30 minutes to complete. When finished, the system reboots.

Step	Action
17.	At the *Welcome to Microsoft Windows* screen, click on **Next**.
18.	At the *Who will use this computer?* screen, type **Nicolet** in the *Your name* field. Click on **Next**. If the site requires a special user account(s), you can set it up on this screen.
19.	At the *Thank You* screen, click on **Finish**. The system boots to Windows XP.
20.	Remove the Recovery CD from the CD drive and store it in a safe place with the rest of the system software. Continue with the next session.

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Load Windows XP Professional
(New Replacement Hard Drive)

Use this procedure to load Windows XP Professional on a replacement hard drive. New hard drives are shipped blank and unformatted/unpartitioned. This procedure takes approximately one hour to perform on a 40GB hard drive, or two hours to perform for a 120GB drive.

Step	Action
1.	Disconnect the power cord from the system and install the new hard drive.
2.	Re-connect the power cord and turn on power to the system. Insert the Omni-Tech Product Recovery CD into the CD drive. If you see a *Fail to load Operating System* message, press **Ctrl-Alt-Del** to reboot. With a blank hard drive installed, the system should automatically boot to the Recovery CD. A blue text-based screen appears, titled *Windows Setup*, while the system loads files.
3.	At the *Welcome to Setup* screen, press **Enter** to set up Windows XP now.
4.	Press **F8** to agree to the license terms.
5.	Highlight the **Unpartitioned space** listing and press **Enter** to set up Windows XP on the selected item. The system creates a new partition and displays a *format options* screen.
6.	Select (highlight) the option to **Format the partition using the NTFS file system**. DO NOT select the "Quick" option. Press **Enter**. The system formats the drive, copies some files, reboots to a Windows XP screen, and displays a series of informational screens while it copies more files This entire process takes about one hour to complete for a 40GB drive.
7.	At the *Regional and Language Options* screen, click on **Next**.
8.	At the *Personalize Your Software* screen, enter the **facility name** in the *Name* field and click on **Next**.

Step	Action
9.	Enter the **Windows XP Product Key**. The Product Key label is normally located on the right side of the computer case. Click on **Next**.
10.	At the Computer Name and Administrator Password screen, enter the correct **Computer Name**, and a password of **nicolet**. Confirm the password and click on **Next**.
11.	Adjust the **Date**, **Time and Time Zone** settings, if necessary, then click on **Next**. The system loads network files.
12.	At the *Network Settings* screen, verify **Typical settings** is selected then click on **Next**.
13.	At the *Workgroup or Computer Domain* screen, select **No, this computer is not on a Network...**. The typical workgroup name is **NICOLET**. Click on **Next**. The system copies more files and configures the system while displaying a series of informational screens. This process takes about 30 minutes to complete. When finished, the system reboots.
14.	At the *Welcome to Microsoft Windows* screen, click on **Next**.
15.	At the *How will this computer connect to the Internet?* screen, select **Local Area Network (LAN)** and click on **Skip**.
16.	At the *Ready to Activate Windows* screen, select **No, remind me every few days**. Click on **Next**.
17.	At the *Who will use this computer?* screen, type **Nicolet** into the *Your Name* field and click on **Next**.

Step	Action
18.	At the *Thank You* screen, click on **Finish**. The system goes to the Windows XP login screen.
19.	If prompted, click on the **VIASYS** user icon to start Windows XP.
20.	From the *Choose an Icon* window, click on **Close** button to exit the window. Close the balloon asking if you wish to take a tour.
21.	Remove the Recovery CD from the CD drive and store it in a safe place with the rest of the system software.

Neurodiagnostic Instruments Service Manual

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Introduction

This chapter provides troubleshooting information and procedures for VIASYS Neurocare's line of XP-based neurodiagnostic instruments - Endeavor CR, VikingQuest and VikingSelect.

The modular construction of these instruments and the USB/FireWire Diagnostic packages included with these systems make troubleshooting easy.

The first part of this chapter describes the use of the USB/FireWire Diagnostics for testing the VIASYS-unique hardware modules.

Next, is a section on Symptoms & Solutions that addresses a variety of potential hardware, software, environmental and operational issues.

Finally, we provide a list of Error Messages that you might encounter and suggestions for resolving these errors.

Try this First

Historically, the most common problems fall under two categories: cabling problems and operational problems. To resolve problems quickly and efficiently, we recommend the following general procedures.

Hardware/Cabling Problems

1. Verify that all system cables are properly connected and securely attached. If necessary, refer to the cabling diagrams at the beginning of Chapter 3.

2. Verify the system is plugged directly into a working hospital grade receptacle. Systems should not be plugged into an extension cord or an unapproved (non-medical grade) power strip.

3. Verify that the power On/Off switch on the isolated power supply or medical grade power strip is turned ON. Verify that the indicator light on the power supply or power strip switch is illuminated. If necessary, check the fuses or circuit breaker.

4. Verify that the indicator lights are illuminated on the base unit, computer, and external modules.

5. Run the **USB/FireWire Diagnostics** to verify that all VIASYS-unique modules are functioning correctly.

6. Check the Device Manager to look for clues to the source of a problem. Refer to Chapter 4: Software Description for detailed instructions on using the Device Manager.

Software/Application Problems

1. For lock up problems during system operation, press and hold the <Ctrl>-<Alt>-<Delete> keys simultaneously to invoke the Windows Security screen, then click on Shut Down to reboot the system.

2. If the problem recurs, reboot and click on **Start>Help and Support>Fixing a problem** for guided troubleshooting assistance related to the Windows XP operating system and computer platform.

3. Verify that the screen savers and power management features are turned off.

4. Verify that no "unauthorized" third-party software packages have been added to the system - especially programs that may load on start-up and run in the background.

5. From each drive's **Properties** screen/**Tools** tab, run the Error Checking utility to verify the integrity of the system's file/directory structure.

6. From each drive's Properties screen/General tab, verify at least 20% free space. Run the Disk Cleaner utility to remove temporary files from the system and conserve disk space.

7. Check the error logs to look for clues to the source of a problem. Refer to Chapter 4: Software Description for detailed instructions on checking the error logs.

Operational Problems

Consult your system User's Guide or On-Line Help for assistance with running the application.

Frequently Asked Questions are posted on the Nicolet Biomedical web site at:

http://www.nicoletbiomedical.com/faqs.shtml

Other Problems

Consult the following Fast Find Index to find solutions for a variety of common problems.

If you are unable top resolve a problem by yourself, contact VIASYS Customer Care for further assistance.

VIASYS Neurocare
Tel: 608/273-5000 or 800/356-0007
Email: madison.helpdesk@viasyshc.com

Neurodiagnostic Instruments Service Manual

Fast Find Index

USB/FireWire Diagnostics

The Endeavor CR, VikingQuest and VikingSelect XP-based systems feature diagnostic packages with a common user interface. The diagnostics are started from a desktop icon:

| *Endeavor CR* | *VikingQuest* | *VikingSelect* |

The diagnostic packages allow a non-technical system user to identify and correct hardware malfunctions associated with VIASYS-designed hardware. Malfunctions may include loose or improper connections, as well as faulty Least Replaceable Units (LRUs).

The diagnostics run in two modes.
- The *AutoTest* mode runs without user interaction, and provides a short Pass/Fail report for each tested LRU.
- The *Manual* test mode requires user interaction. Individual tests are provided for the headbox, control panel, auditory stimulator and electrical stimulator.

To start the Diagnostics, click on the **Diagnostics** icon, or select **Start>Programs>Nicolet>Tools>***Diagnostics*. A Caution window appears, reminding you to disconnect all patient electrodes to the patient before proceeding. Click on **OK** to close the window.

The *Diagnostics* window opens, displaying a menu bar, an instruction panel, and a results panel. Each test provides on-screen instructions.
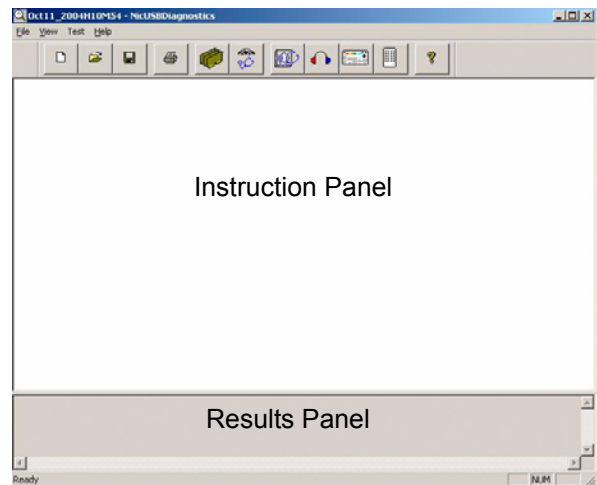
Diagnostics Window

The bottom of the page shows the diagnostic menu bars for the Endeavor CR, VikingQuest, and VikingSelect respectively.
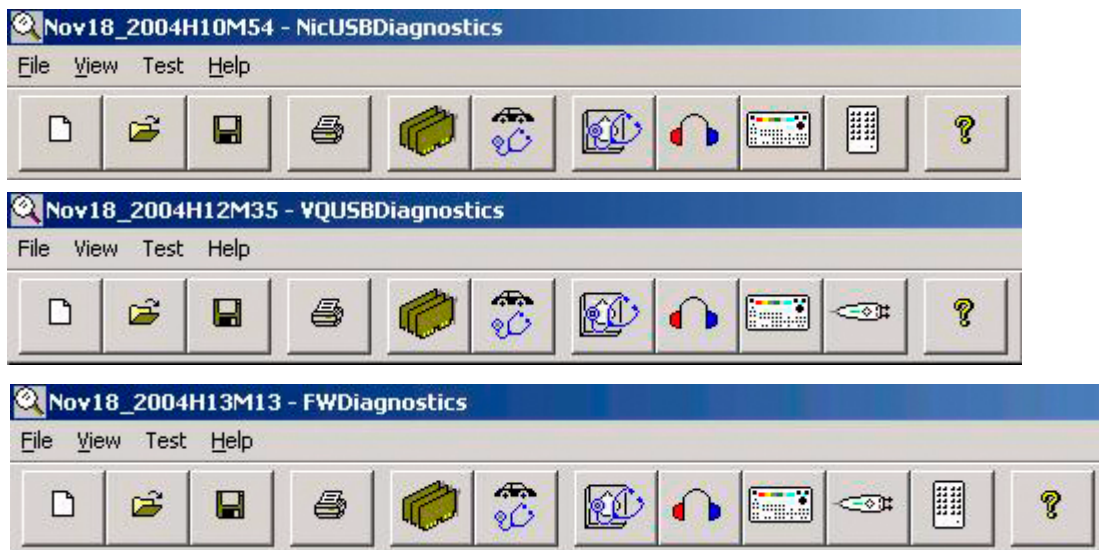
Diagnostics Menu Bars

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AutoTest

The **AutoTest** button starts the set of automatic tests. The AutoTest software module tries to read ID registers on the base board, control panel, stimulators, amplifiers, and headboxes. Test results are displayed as Pass/Fail.

```
Start the AutoTest
USB Stimulate Baseboard Test Passed.
Auditory stimulator Test Passed.
IOM Electric Stim Pods Test Passed.
IOM Control Panel Test Passed.
IOM EP16  Amplifier: Amplifier Test Passed.
EP16 Head Box: Headbox Type Test Passed.
End AutoTest
```

AutoTest Results (Endeavor CR)

For Endeavor CR and VikingSelect systems, if the amplifier is detected, the diagnostics perform an amplifier calibration test.

The diagnostic sets the filters to a known state. The amplifier generates a 20Hz sine wave calibration signal. This signal is applied to the non-inverting (+) input of all channels, and the inverting (-) inputs are connected to ground. The diagnostic software performs three calibration tests at gain settings of 100, 10000 and 10,000 respectively, using sine wave peak-to-peak amplitudes of 20mV, 2mV and 200uV respectively. The diagnostic reads the resulting set of values from the ADC. If all channels are within +/-10% of the correct ADC value, the amplifier test passes. If the amplifier test fails, software also identifies the failing channel(s).

Since the VikingQuest amplifier circuitry is physically divided between the preamplifier module and base unit, the AutoTest does not perform an amplifier calibration test. It checks the ADC only. The calibration test is preformed as part of the manual Head Box Test instead.

The following chart lists the physical assemblies checked by the AutoTest for the Endeavor CR, VikingQuest and VikingSelect.

Endeavor CR	VikingQuest	VikingSelect	VikingSelect *STOOB
ECR Base Bd.	VQ USB Base Bd.	ISA Auditory Stim Bd.	SC-1 Stimulus Controller
Auditory Stim Bd.	Auditory Stim Bd.	ISA E-Stim Bd.	ES-8 Amplifier
IOM Electrical Stim Pods	Stim Input Firmware	D-Stim Controller Bd.	ET16A & ET-16B Head Box Type
IOM Control Panel	2nd Electrical Stimulator	ES-8 Amplifier	EA-2 or EA-4 Amplifier
IOM EP16 Amplifier	VQ Base ADC	ET16A & ET-16B Head Box Type	
EP16 Head Box Type		EA-2 or EA-4 Amplifier	
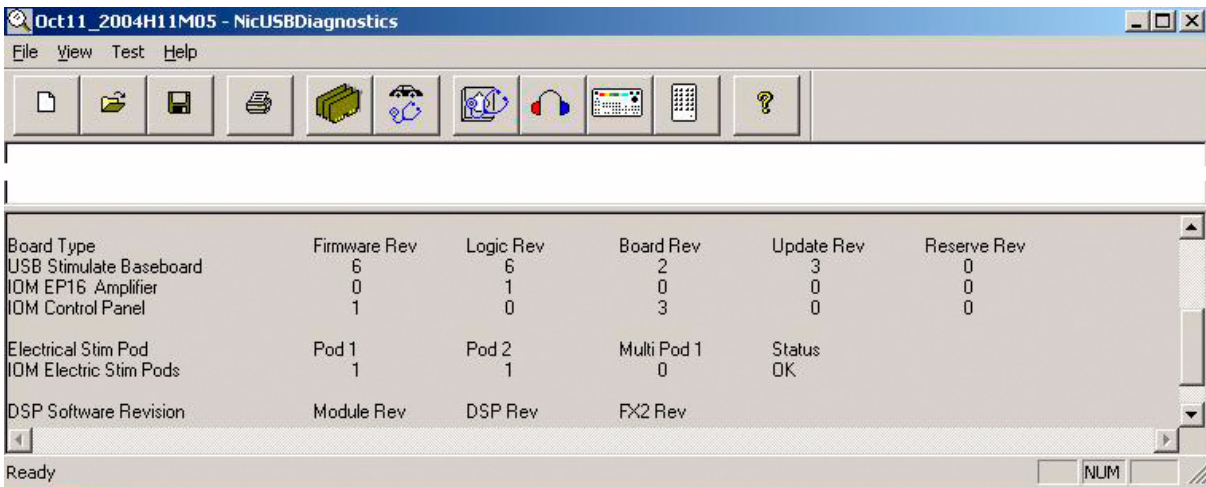
STOOB = STim Out Of the Box

Board Report

The **Board Report** button provides a more detailed list of board findings, including hardware revision levels for the base board, amplifier, control panel and stimulators, as well as the base board DSP firmware version. The diagram at the bottom of the page shows the board report for an Endeavor CR.

Board Report for Endeavor CR

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Manual Tests

The Manual Tests require user interaction to verify headbox integrity and stimulator output.

Head Box Test (Endeavor CR)

This test requires you to connect an electrode linker cable (019-401000) from the EP16 Amplifier Cal output to each HB-1 and HB-2 headbox input connector

The EP16 amplifier generates a 2uV, 20Hz sine wave calibration signal that is routed via the jumper to a headbox input. The Diagnostics software continually scans the electrode inputs and measures the ADC value for each channel. When the software detects a valid ADC level (24576 +/- 10%), it displays a green status box for the associated headbox input. Software continues to scan the electrode inputs until you complete the test by pressing Pass, Fail, Cancel or Reset.

You may view the ADC values for each electrode input by enabling the View Detailed report.
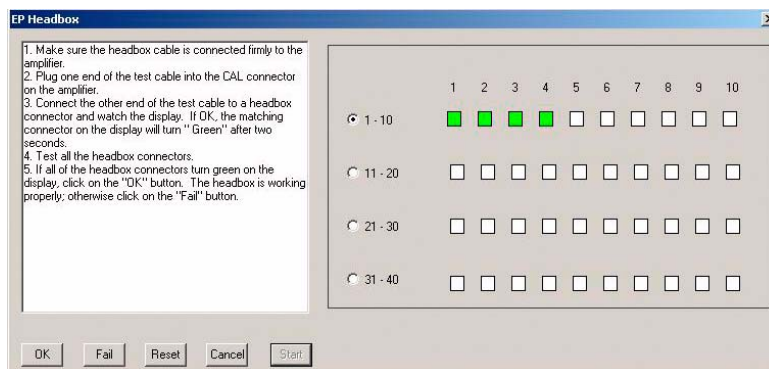
Endeavor CR Head Box Test and Diagnostics Screen

Head Box Test (VikingSelect)

The Head Box test for the VikingSelect ET16A and ET-16B head boxes uses the same algorithm as the Endeavor CR.
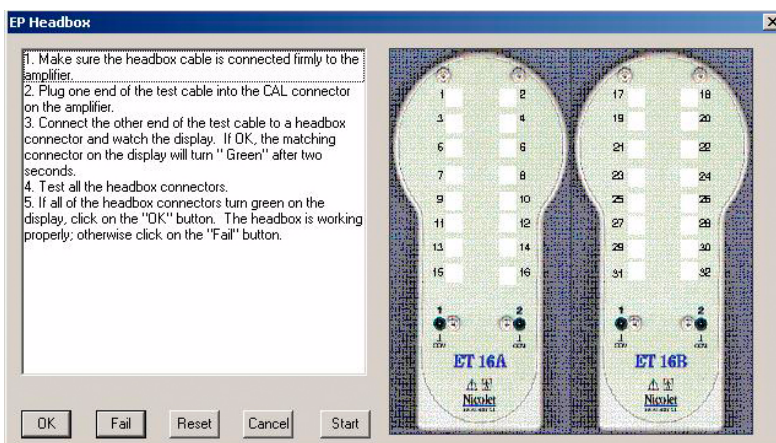
VikingSelect Head Box Test and Diagnostics Screen

Amplifier Test (VikingQuest)

The VikingQuest Amplifier Test requires you to jumper a calibration signal from the base unit's Calibration Out connector to an amplifier channel's -, + and common inputs using a special loop-back calibration cable (P/N 085-420401).

The Diagnostic software generates a square wave calibration signal of +1V, 1ms duration with a baseline at 0V.

When you press the Start button, the software acquires data and looks for an ADC count of 6553 +/-6%. If the count is within range, the software displays a green status box to signify the calibration test passed. If the test fails, software displays a red status box.

You must repeat the test for each amplifier channel and press the Pass, Fail, or Cancel button to exit the test.
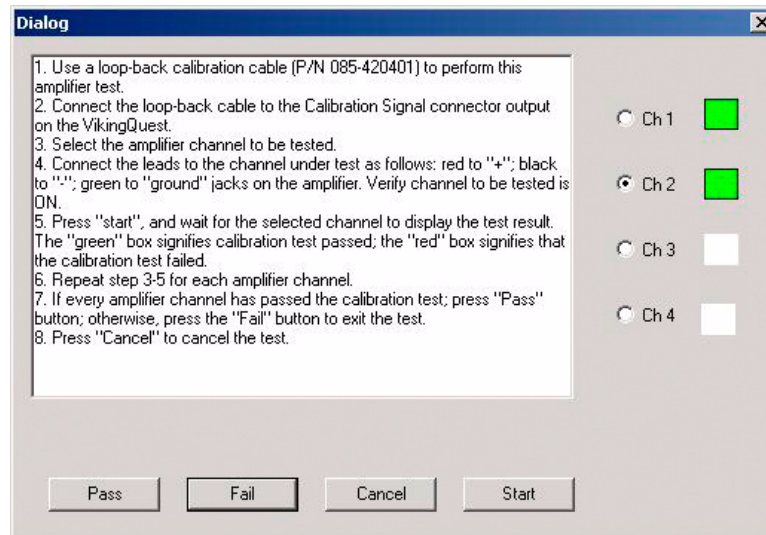
VikingQuest Amplifier Test and Diagnostic Screen

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Auditory Test (All Instruments)

The Auditory Test requires you to verify audible click and tone burst signals from the left and right headphones.

This Diagnostic screen is the same for Endeavor CR, VikingQuest and VikingSelect.
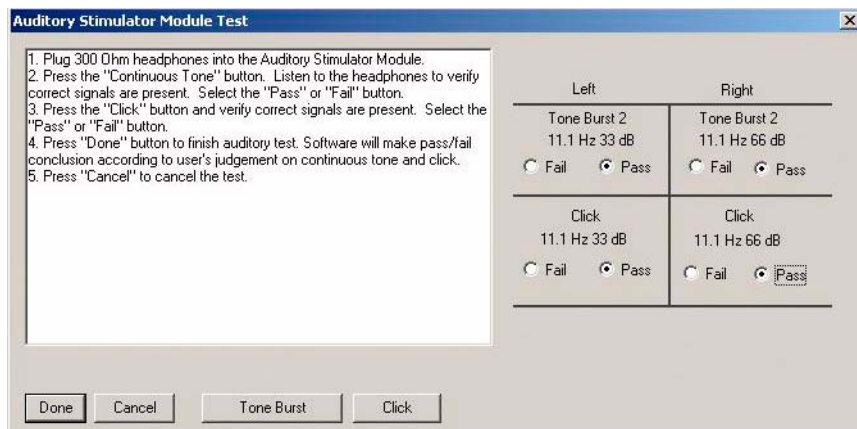
Auditory Stimulator Diagnostic Screen

Control Panel Test
(Endeavor CR and VikingSelect)

The Control Panel Test for the Endeavor CR and VikingSelect checks for proper operation of each control panel's potentiometers.

The Endeavor CR's control panel contains five potentiometers; the VikingSelect contains two potentiometers.
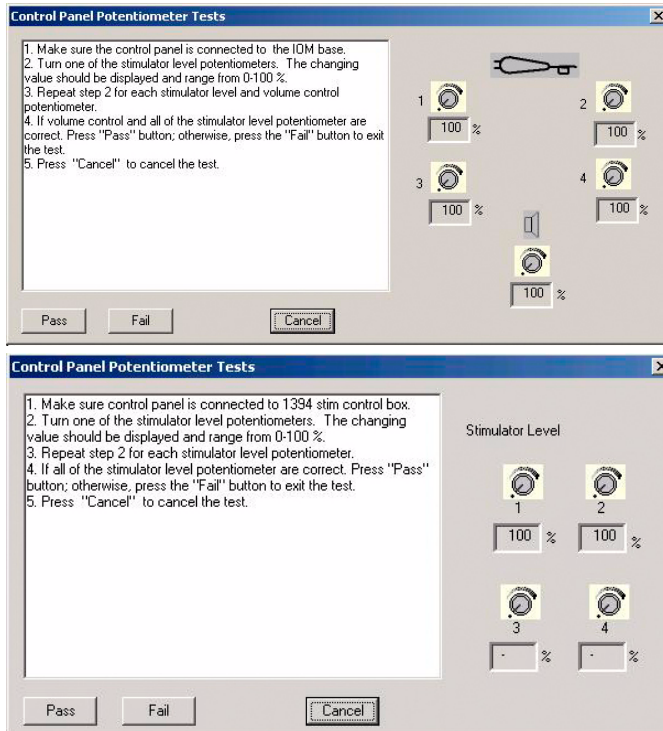
Endeavor CR

VikingSelect

Control Panel Diagnostic Screens

Control Panel Test (VikingQuest)

The Control Panel Test for the VikingQuest is more comprehensive than the equivalent test for Endeavor CR and VikingSelect.

For VikingQuest, the Control Panel Test checks for proper functioning of all the buttons, as well as the control panel's potentiometers.

VikingQuest Control Panel Diagnostic Screen

Smart Probe Test (VikingQuest)

The Smart Probe Test for the VikingQuest checks the operation of the S403 Current Probe plugged into the VikingQuest Base Unit's rear panel.

When you press each push button on the probe, the software increments an associated counter on the screen.

Turning the probe wheel displays a percentage reading between 0 and 100%.

To check electrical stimulus delivery, you may stimulate your wrist or thumb muscle by pressing one of the probe push buttons. The current level is controlled by probe wheel, with a maximum value of 25mA delivered.

Press the Pass, Fail, or Cancel button to verify the test results and exit the Smart Probe test.
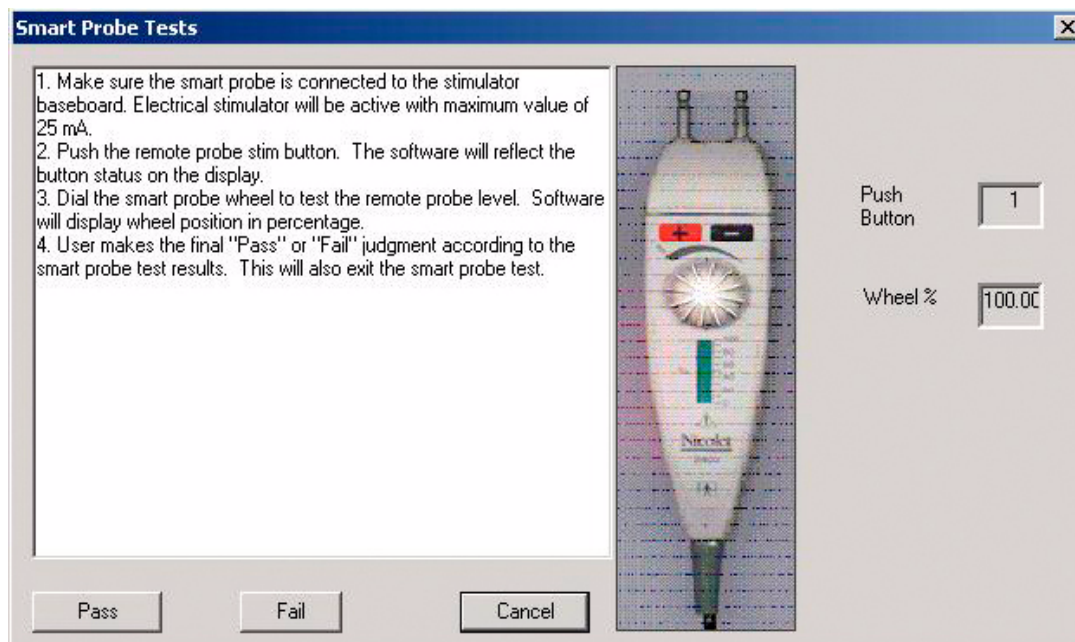
VikingQuest Stim Probe Diagnostic Screen

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Smart Probe Test (VikingSelect)

The Smart Probe Test for the VikingSelect checks the operation of up to two S403 Current Probes plugged into the IES-2 Clinical Electrical Stimulator modules.

You must first select which stimulus probe (Ch1-2) you wish to test. When you press each push button on a probe, the software increments the associated counter on the screen. Turning the probe wheel displays a percentage reading between 0 and 100%.

To check electrical stimulus delivery, short the + and - probe tips together and press the Stim Loop Back button. The system will display a green or red filled box, indicating a pass/fail result for the probe being tested.

Press the Pass, Fail, or Cancel button to verify the test results and exit the Smart Probe test.
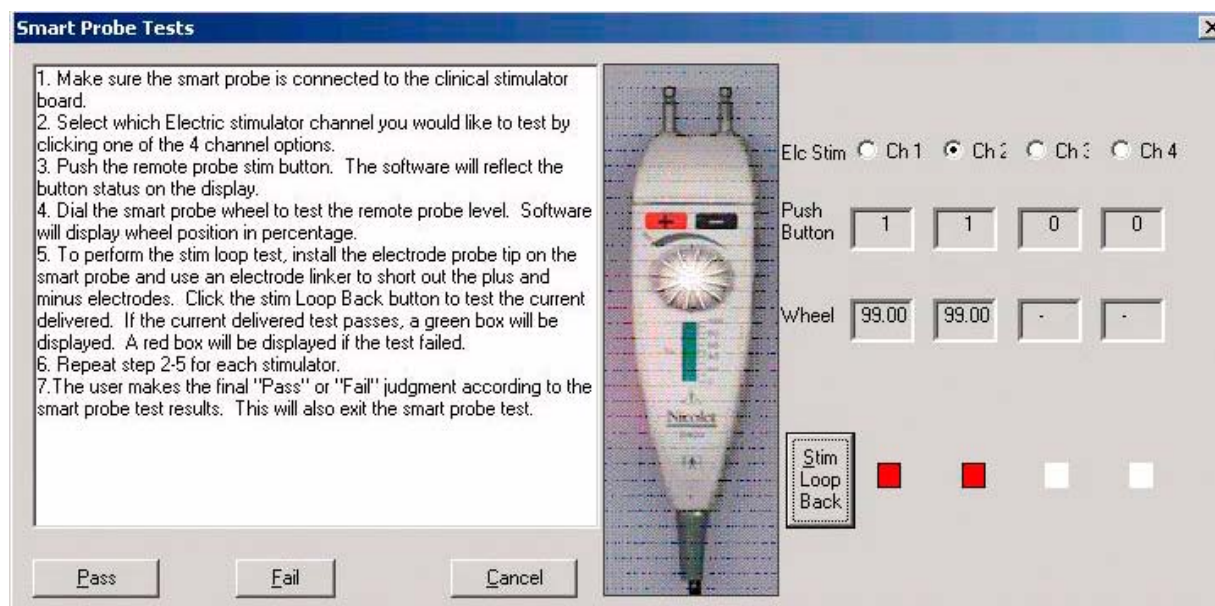
VikingSelect Stim Probe Diagnostic Screen

Note: The Stim Probe Tests panel shows four channels of electrical stimulator probes, however, only channels 1 and 2 are used. At one point in product development, there was a plan to allow two IES-2 modules to be used on a single instrument; this plan was not implemented.

IOM Electrical Stim Test (Endeavor CR and VikingSelect)

The IOM Electrical Stim Test is common to the Endeavor CR and the VikingSelect.

For the Endeavor CR, this test verifies delivery of an electrical stimulus to each of the Stimulus Pod output connectors. For the VikingSelect, this test verifies stimulus delivery to each connector pair on the IES-16 IOM Electrical Stimulator module.

For either instrument, the test requires you to place a jumper between the pairs of output connectors, then select the jumpered pair on the Diagnostic screen.

Software sends a 5mA current pulse to the selected connector pair and reads back the delivered level. If the delivered level is within +/- 10% of the intensity value, software displays a green box, indicating a pass status. Otherwise, software displays a red box, indicating a failure.

Jumpered Outputs on the SP-1 Stimulus Pod

You must repeat the test for all electrode pairs for each channel.

Press the Pass, Fail, or Cancel button to verify the test results and exit the IOM Electrical Stimulator test.

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Electrical Stimulator Diagnostic Screen - Endeavor CR

Electrical Stimulator Diagnostic Screen - VikingSelect

Note: The Viking Select IES-16 Electrical Stimulator has an external address switch that defines the stimulus channels as either E1/E2, or E3/E4. For VikingSelect systems that have an IES-2 and IES-16 stimulator connected simultaneously, this switch must be set to the E3/E4 position, and the diagnostic conducted using the E3/E4 columns.

File Management

The Diagnostic software provides several menu buttons for managing test reports.

New

The New button creates a new text file that contains the results of the current test.

Open

The Open button opens a previously created test results file.

Save

The Save button lets you save a newly created test results file.

Print

The Print button lets you print a hardcopy of the test results file that is currently open.

Diagnostic Error Codes

When the Diagnostic software detects a failure, it provides an error code to pinpoint the failure mode. The error code is presented in the form xxx-yyy, where xxx represents the LRU and yyy is the result code for pass or fail.

The following charts summarize the error codes:

Endeavor CR Error Messages

LRU	Error Code	Error Message
100	1	STIM Test Passed
100	2	STIM Test Failed
100	3	STIM Test Failed: Base board is not connected
100	4	STIM Test Failed: Software error
100	5	STIM Test Failed: Software setting error
100	6	STIM Test Failed: Auditory board is not connected
200	1	Amplifier Test Passed
200	2	Amplifier Test Failed
200	3	Amplifier Test Failed: Amplifier is not connected
200	4	Amplifier Test Failed: Amplifier settings error
200	5	Amplifier Test Failed: Calibration error
300	1	Control Panel Test Passed
300	2	Control Panel Test Failed (not connected)
400	1	Stim Pod Test Passed
400	2	Stim Pod Test Failed (not connected or illegal pods configuration)
500	1	Headbox Test Passed
500	2	Headbox Test Failed: Incorrect headbox type
500	3	Headbox Test Failed: Amplifier is not connected
500	4	Headbox Test Failed: No headbox has been connected
700	1	Auditory Stimulator Test Passed
700	2	Auditory Stimulator Test Failed (not connected)

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VikingQuest Error Messages

LRU	Error Code	Error Message
100	0	STIM Test Passed
100	1	STIM Test Failed
100	2	STIM Test Failed: Base board is not connected
100	3	STIM Test Failed: Software error
100	4	STIM Test Failed: Software setting error
100	5	STIM Test Failed: Auditory board is not connected
200	0	Amplifier Test Passed
200	1	Amplifier Test Failed
300	0	Control Panel Test Passed
300	1	Control Panel Test Failed
400	0	Auditory Stimulator Test Passed
400	1	Auditory Stimulator Test Failed
600	0	Smart Probe Test Passed
600	1	Smart Probe Test Failed
700	0	Base board Firmware Test Passed
700	1	Base board Firmware Test Failed
800	0	Base board ADC Test Passed
800	1	Base board ADC Test Failed
800	2	Base board ADC Test Failed: Amplifier is not connected
800	3	Base board ADC Test Failed: Amplifier settings error
800	4	Base board ADC Test Failed: Amplifier acquisition error
800	5	Base board ADC Test Failed: ADC out of valid range
800	6	Base board ADC Test Failed: Data loss error

LRU	Error Code	Error Message
900	0	2nd Electrical Stimulator Test Passed
900	1	2nd Electrical Stimulator Test Failed

VikingSelect Error Messages

LRU	Error Code	Error Message
100	0	STIM Test Passed
100	1	STIM Test Failed
100	2	STIM Test Failed: Base board is not connected
100	3	STIM Test Failed: Software error
100	4	STIM Test Failed: Software setting error
100	5	STIM Test Failed: Auditory board is not connected
200	0	Amplifier Test Passed
200	1	Amplifier Test Failed
300	0	Control Panel Test Passed
300	1	Control Panel Test Failed
400	0	Auditory Stimulator Test Passed
400	1	Auditory Stimulator Test Failed
600	0	Smart Probe Test Passed
600	1	Smart Probe Test Failed
700	0	Base board Firmware Test Passed
700	1	Base board Firmware Test Failed
800	0	Base board ADC Test Passed
800	1	Base board ADC Test Failed
800	2	Base board ADC Test Failed: Amplifier is not connected
800	3	Base board ADC Test Failed: Amplifier settings error

LRU	Error Code	Error Message
800	4	Base board ADC Test Failed: Amplifier acquisition error
800	5	Base board ADC Test Failed: ADC out of valid range
800	6	Base board ADC Test Failed: Data loss error
900	0	2nd Electrical Stimulator Test Passed
900	1	2nd Electrical Stimulator Test Failed

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Symptoms and Solutions

This section describes some specific troubleshooting techniques to try for several symptom categories.

Noise/Artifact Problems

Noisy waveforms are the most common type of problem with neurodiagnostic systems, as the amplifiers are very sensitive, and able to pick up minute amounts of noise from a variety of sources. Evoked potential tests and sensory nerve conduction tests are most affected by noise problems.

The causes of noise problems may be:
- poor electrode application
- incorrect filter/sensitivity settings
- incorrect stimulus rate settings
- a noisy environment
- faulty amplifiers

Use the following checklists to determine and resolve the most common noise-related problems.

Troubleshooting Noise: Environmental Checklist

☑		Items to check	Detail
❑	1.	Make sure any CRT monitor in the room is separated from the amplifier.	We recommend 2 to 3 feet away from the amplifier. LCD flat panel displays are not a significant problem.
❑	2.	Turn off all fluorescent lights or dimmer switches when operating the equipment.	Do not have dimmers set to the middle position.
❑	3.	Turn off and unplug any equipment in the same room as the system.	
❑	4.	Remove any outlet strips or extension cords, if used, to connect the system to the wall outlet	System should plug directly into the wall from its isolated power supply or from the cart-mounted medical grade power strip supplied by VIASYS.
❑	5.	If using a metal bed, is it grounded?	Verify with an electrician or Biomedical Engineer.
❑	6.	Use a dedicated circuit (line) for the system. Make sure no other devices are plugged into the same outlet	Verify with an electrician or Biomedical Engineer.
❑	7.	Make sure your wall outlet has proper grounding. Approximate age of wiring in the walls: _____	Verify with an electrician or Biomedical Engineer.
❑	8.	Do you have a radio station transmission tower nearby? Yes: ___ No: ___	If Yes, enter approximate distance in ft. to the station.
❑	9.	Are there any large electrical devices in adjacent rooms? Above or below? Yes: ___ No: ___	X-ray equipment, MRI, refrigerator, air conditioner, elevator motors, etc.
❑	10.	Are there any large power feeds or circuit boxes in nearby walls? Yes: ___ No: ___	Circuit breaker boxes, fuse boxes, large metal containers, etc.
❑	11.	Are there any data cables in the walls of the testing room? Yes: ___ No: ___	GND shield terminated only at one end.

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Troubleshooting Noise: Environmental Checklist

☑		Items to check	Detail
❑	**12.**	If in an office environment, are there any appliances in the room with the system? Yes: ___ No: ___	Toasters, microwaves, computers, lamps, coffee machines, etc.
❑	**13.**	Unplug any non-critical care equipment in the O.R.	Heat lamps, microscope, electric bed, warmers, etc.
❑	**14.**	Move the system to a different room away from the existing location.	Move the system to a different part of the building.
	15.	If using the system in the operating room, momentarily unplug the Bovie Knife.	Disconnect Bovie from the wall outlet.

Troubleshooting Noise: Electrode Application Checklist

☑		Items to check	Detail
❑	**1.**	If using a Concentric Needle Adapter, make sure it has a good patient ground connection.	The ground wire on the adapter should have a patient ground lead
❑	**2.**	Do you have a good patient ground connection to the amplifier?	Use the largest ground pad electrode you have. Do not use a needle electrode for ground.
❑	**3.**	Verify that all electrodes and/or needles are inserted tightly into the amplifier connectors.	Push in each connector at the amplifier inputs.
❑	**4.**	Verify that all electrodes and/or needles are attached correctly to the patient.	Reapply electrodes if necessary.
❑	**5.**	Bundle/braid all recording electrode leads together. There should be no looping wires on the patient.	Helpful in reducing 50Hz/60Hz noise.
❑	**6.**	Make sure the stim transducer cables, stim electrode leads and any power cords are separated from the recording electrode leads.	If the recording electrode leads must cross other leads/cables, make sure they cross perpendicular to each other.
❑	**7.**	Use electrodes that are made of the same types of metal and the same manufacturer.	Do not mix metals or manufacturers.
❑	**8.**	Swap the existing electrodes with new ones.	Electrodes do wear out.
❑	**9.**	Try a different brand of electrodes to eliminate the possibility of a common flaw in the electrodes.	Type, batch or style of electrode.
❑	**10.**	Remove the EEG grounding mat if one exists.	May act as an antenna for noise.
❑	**11.**	Do not place the ground electrode on middle of patient's chest. Try the shoulder or thigh instead.	EKG residual waves look much like 60Hz.

Troubleshooting Noise: Equipment Checklist

☑		Items to check	Detail
❑	1.	Check the live signal (View Input mode). If noise is locked in place on the waveform or seemingly triggered from one place on the waveform screen, change the stimulator rate to an odd number to avoid time-locking the sweep to 50/60Hz noise.	Adjust the stim rate until the signal rolls on the screen. This will be averaged out over time. Use an odd number, such as 10.3 or 11.1 stimuli/sec. for an ABR; 4.7 or 5.1 for a VEP.
❑	2.	Check the impedance of surface electrodes. For evoked potential studies; electrode impedances should be below 5Kohms and matched within 1.5Kohms. For the O.R., look for a good balance under 30Kohms.	DO NOT check impedances on concentric needles or ring electrodes.
❑	3.	In most applications, do not let the stim rate exceed the acquisition window (timebase).	Formula: $(1/[\text{Stim Rate}] < \text{Timebase}$
❑	4.	Short the recording electrodes together temporarily in free run EMG mode, or in View Input mode.	If the noise disappears, the amplifier is OK, and the problem is most likely electrode-related.
❑	5.	If 50Hz/60Hz noise is suspected, measure the time interval between consecutive peaks with your cursors.	20ms = 50Hz noise 16.6ms = 60 Hz noise
❑	6.	If in the O.R., run a baseline before you start the surgery to verify proper system operation.	Perform the baseline test before other equipment is powered up.
❑	7.	Put a loose knot in the power cord to disrupt the possible antenna effect.	
❑	8.	Orient the computer/cart/amplifier in different directions and watch for changes in noise levels	Rotate, or move the amplifier around the room.
❑	9.	Try rotating the patient's chair 90 degrees.	

Flat Line Data Problems

Flat line data problems are often caused by incorrect parameter settings, loose connections, or static electricity damage to the amplifier inputs (in cold dry climates).

On the VikingQuest amplifiers, make sure the amplifier switches are pressed in.

Run the USB/Firewire Diagnostic AutoTest and amplifier/headbox tests.

With system power off, disconnect and reconnect the external cable connections. Verify correct sensitivity and filter settings. Increase the amplifier sensitivity (SNS) setting and try recording. Try this step a few times. If the new setting displays curve data, the problem was an incorrect parameter setting.

For the Vikings, enter the free run EMG mode and run a calibration pulse for each channel.

If a single channel, or set of channels consistently display a flat line, suspect the headbox, headbox cable, or amplifier module. There may be a loose or broken connection in the headbox/amplifier signal path or static electricity may have damaged the affected amplifier channels.

If all channels are affected, the problem may be caused by the amplifier, amplifier cable, or a problem in the base unit.

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Other Data-Related Problems

No patient data displayed

After you have verified that the system power is OFF, disconnect and reconnect the cabling from the amplifier to the console base. Disconnect and reconnect all cabling to the console base and the processor.

Run the USB/FireWire Diagnostics to verify the amplifier/stimulator modules are recognized and functioning correctly.

If no trace appears on the display after pressing Switch and Ave, check the View Input mode to make sure that the system is simply not rejecting all data due to excessive artifact or an incorrect sensitivity setting.

Use a different amplifier channel. (Note: Remember to change channels in the software also.)

Try changing sensitivity and filter settings.

Run a cal pulse using the EMG test mode. Try all amplifier channels.

Try using a different settings file that is similar to the file used.

Try using any free running EMG or NCS protocol. If you do see free running EMG traces, suspect a stimulator/trigger failure.

If the problem occurs only on a single channel, replace the electrodes.

Exit the application and shutdown the system, using the shutdown procedure to reset the parameters.

Run Disk Check to verify the hard disk integrity.

System locks up during data acquisition

If possible, exit the application and reenter your test.

Press **Ctrl**+**Alt**+**Delete** to access the Windows Security screen. Click on Shutdown. Power down, wait for 30 seconds, then reboot.

A lockup during data acquisition may indicate a hardware problem with the A/D converter. Run the USB/FireWire Diagnostics to test that possibility.

Use the Event Viewer to examine the Application Log for possible software errors.

Verify that you do not have multiple VIASYS acquisition applications loaded on the same computer. They may not co-exist well (This should not be a problem with customer units, only with VIASYS demo computers that are loaded with multiple product software packages, for example Bravo + VikingQuest + VikingSelect.).

From the Disk Manager, run the Disk Check utility.

Static discharge may have occurred. If this is possible, spray the entire area with static guard.

Try a different test modality. If that modality works, reload the application software. For the Vikings, reload the Master software, if necessary.

Is an error message displayed on the screen? If so, refer to the Error Messages section of this chapter.

Log the events which occurred before the lockup. List the sequence of button presses, tests performed and exactly what was done prior to lockup.

Perform a power audit using an Onegraph or other power monitoring device.

Measure the voltage from the wall outlet.

Amplifier Problems

Launch the USB or FireWire Diagnostics and run the AutoTest to perform a thorough check of the amplifier module. If an amplifier is detected, the diagnostic software generates a calibration signal and automatically verifies proper signal processing within the amplifier module, as well as communication between the amplifier module and the computer.

Run the manual Headbox Test to check signal path integrity from the headbox inputs to the host computer.

Plugging/Unplugging Amplifiers

The Endeavor CR amplifiers connect to the system using a USB interface. The VikingSelect amplifier modules connect to the system using a FireWire interface

When you plug/unplug one of the above modules with power applied, there is no danger of physical damage to the system. However, the application software does not detect that a module exchange has taken place, and the software may not operate properly. Therefore, we recommend powering down the system before exchanging any modules.

CAUTION
Never disconnect or reconnect the VikingQuest amplifier or amplifier arm with the system power on. This practice will damage the amplifiers.

Filter Tests

The Endeavor CR and Viking amplifier systems use a combination of digital (software) and hardware filters. Normally, the USB/FireWire diagnostics will detect amplifier problems. If, however, you experience a wave shape-related problem that is ambiguous in nature, you may want to verify that all hardware filters are working properly.

The generic test for hardware filters is to run a common square wave calibration pulse through all amplifier channels, and observe the effects of the filter settings on the shape of the waveform. This test works best with all channels displayed at the same time and, if possible, overlaid. A time base of 10ms full screen (1ms/div) is optimal for showing changes in wave shape. On the Viking, an EP or MMP test screen can be set up for performing the filter tests. The VikingQuest requires an external calibration pulse.

NOTE: **Version 7.4 VikingQuest software does not allow checking filters by this method, as the amplifier is shut off during presentation of the external cal pulse for purposes of stimulus artifact reduction. Software version 8.2 will feature a Calibration mode, where the artifact reduction feature will be turned off.**

Low Frequency Filter

Start with the LFF and HFF filter settings wide open. As you raise the LFF setting, the waveform shape gradually changes to a form that resembles the charge/discharge current in a capacitive circuit

.

LFF=0.5Hz
HFF=15kHz

LFF=10Hz
HFF=15kHz

LFF=100Hz
HFF=15kHz
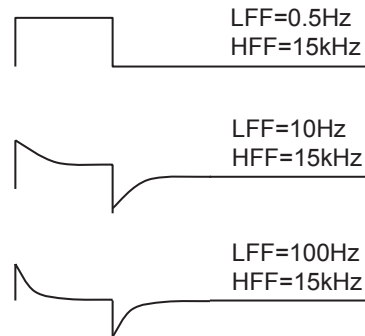
Effects of LFF Settings on a
Square Wave Calibration Pulse

High Frequency Filter

Start with the LFF and HFF filter settings wide open. As you lower the HFF setting, the waveform shape gradually rounds off.

LFF=0.5Hz
HFF=15kHz

LFF=0.5Hz
Hff=5kHz

LFF-0.5Hz
HFF=1kHz
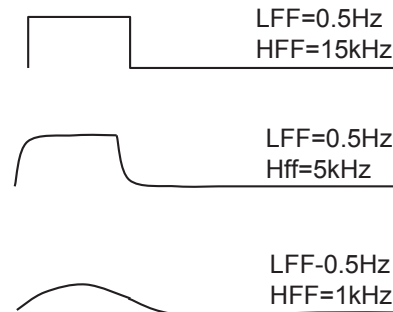
Effects of HFF Settings on a
Square Wave Calibration Pulse

The example below shows a VikingSelect EP waveform screen set up to perform a filter check on eight overlaid amplifier channels.
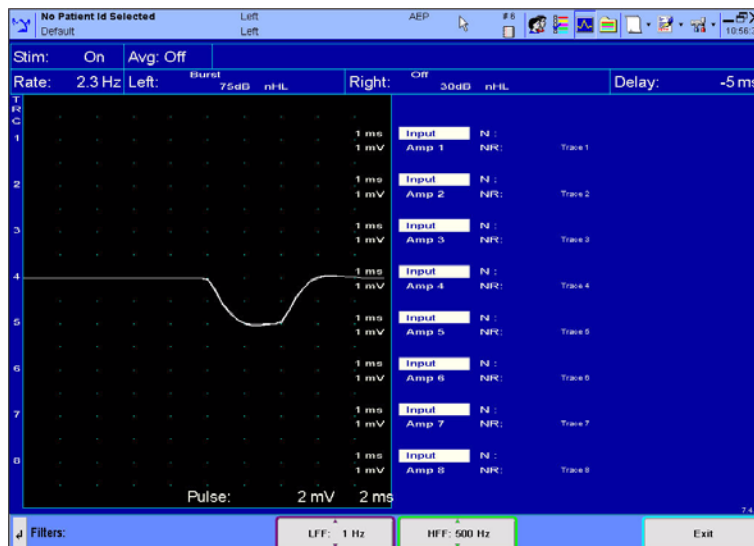
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Computer Problems

Base Unit blows fuses

Before you attach a laptop computer's power adapter to the base unit, make sure the laptop's batteries are fully charged. The laptop may draw enough current to blow the fuses on the base unit.

Boot problems

Determine where in the boot process the system fails.

1. Have you just worked on the system? For desktop systems, recheck the orientation and security of all internal cable connections. Verify all boards are correctly placed and firmly seated.

2. Have you just added new hardware or software, If so, try restoring XP to an earlier restore point.

3. Does the POST (Power On Self Test) complete? Does it issue a beep code or display an error message on the screen?

4. Check the CMOS settings to verify the factory-default settings have not been modified accidently.

5. Do the fans and indicator lights turn on when you power on the system? If not, check the following:

   - Verify a good source of a.c. power and that the power cord is functional and securely connected.

   - Measure the power supply voltages at the motherboard.

   - For desktop systems, remove all expansion cards and disconnect the drives, leaving only the monitor and keyboard attached. Does the system start up with this minimal configuration? If not, replace the power supply.

   - If yes, connect the drives and replace the expansion cards one-by-one until you determine which part may be causing the power supply to fail.

NOTE: For earlier VIASYS instruments, we recommended the use of the #1TuffTest floppy-based diagnostic to check motherboard integrity. The BIS (Boot Integrity Service) feature of many newer motherboards does not allow the system to load non-standard operating systems or files during the boot process. Since TuffTest is written in machine code, and is independent of any operating system, it may not be useful for testing newer platforms.

Slow operation (VikingQuest)

If you replace printers and install a new printer driver on the system, the waveform data displayed on the screen may become very slow. The QMUP test displays a slow-moving flat dashed data line. To resolve this issue, you have to uninstall the printer driver, reinstall the printer driver, then reload the Master Software, in that order. Refer to Chapter 3: Printers/Printer Drivers for detailed information.

Display Problems

No display for desktop-based systems

Make sure the monitor is turned on (switch is on the front or the side of the monitor) and plugged into the video connector at the back of the computer. Verify the green power indicator light is on. Reseat the monitor power cable.

The brightness and/or contrast controls on your monitor Verify the isolation power supply and computer power switches are turned on.

Check the video cable for bent or pushed-in pins.

No display for laptop systems

Press the Space Bar to "wake up" the computer. Press the Purple button to return the laptop from the "Hibernate" mode.

Slide the laptop power switch off, then on again to reboot the system.

Printer Problems

Common printer problems include:

- Your printer generates nonsense printouts
- Your printer will not print a screen copy.
- Your printer is continuously feeding paper.

These conditions usually indicate that the wrong printer type is selected in the Printer Setup of the Master Settings.

Preliminary check

Consult the troubleshooting section in your printer manual.

Check that all printer cables are connected properly and are not kinked.

For Viking systems, check the Master Settings File, Printer Setup, for the correct printer selection.

Check that the printer is turned on.

Check that the printer paper tray has paper in it.

Run a printer self test. See your printer user manual.

Delete the items in the print buffer to stop printing (See instructions below).

Deleting printouts (VikingQuest and VikingSelect)

1. Make sure the printer is connected to the VikingQuest, has paper loaded and is turned off.

2. Go to the Master Main Menu, select Utilities, then select Exit Viking to Windows.

3. Open the Program Manager by double clicking on the Program Manager icon., if necessary, then open the Main folder. Click on the Print Manager icon to open the Windows Print Manager.

4. Verify the default printer is set to the proper printer. To do this, select Options, then Printer Setup. If your printer is not set as the default, highlight it and select Set as Default.

5. Close the options window and check the printer spool for any screen copies. If they are there, you will see a printer icon below your printer type with a listing of "X"% of VikingQuest screen copy complete.

6. Highlight the screen copy line and click on the Delete key in the tool bar line. Wait about 30 seconds to see if another screen copy appears and delete it. Do these steps for ALL screen copies in the buffer. Return to the Master Main Menu. Turn on the printer, then try printing again. If the problem persists, go to the next part of this section

If the previous steps do not fix the printer problem, please try the following:.

1. Go to the Master Main Menu, select Utilities, then select Exit to Windows.

2. Open the Program Manager (by double clicking on the Program Manager icon.)

3. Open the Main window and then open the File Manager (double click on icons to open.).

4. From the File Manager, double click on the vikdir directory

5. Double click on the spool directory.

6. When you open the spool directory, you may see some files come up on the right side of the screen, if so, ALL OF THESE FILES MUST BE DELETED. (These files may be called spmeta, splot, report.tmp, etc.) To delete these files, highlight the first file by clicking on it once. It will be highlighted blue. Next scroll down to the last file and hold down the [shift] key on the keyboard and click the left mouse button. This will highlight ALL of the files in the spool directory. Go to the File menu at the top of the screen and click on Delete to delete all the files.

7. Once all the files are deleted, close the File Manager and Main windows and go back to the VikingQuest Master Menu. Run the shutdown procedure, power down, and reboot.

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Electrical Stimulator Problems

Is the VikingQuest or VikingSelect control panel Stimulator LED blinking to indicate a STIM ON condition? If so, is the Stim Probe connected to the probe jack?

On the Endeavor CR, Is the STIM LED blinking? To view the Stim LED, look though the ventilation slots at the lower right side of the base unit case. The yellow LED should be blinking whenever a stim pulse is being delivered (The blue LED is a power indicator.)

Check the stimulator cabling for secure and proper connections.

Run the USB/FireWire Diagnostics to verify the condition of the electrical stimulator and probes.

Does the display show the amount of current to be delivered? If it does not, verify that the proper stimulator mode is selected (Console vs. Remote). Display the Mode parameter and settings. Select Remote when using the stimulator probe; select Console when using the Stimulator Level dial on the control panel or stimulating electrodes

Exit the VIASYS acquisition application and reenter the test.

Testing Electrical Stimulator Specifications

If you suspect an electrical stimulator is not performing to specification, you may check the stimulator output using a 4 Kohm load and oscilloscope. Alternatively, you can use the instrument itself as a digital oscilloscope by connecting the stimulator output to a load/attenuator test fixture and feeding the attenuated signal to your system's amplifier. The following schematic diagram shows a suitable loop back test fixture.

NOTE: Version 7.4 VikingQuest software does not allow checking the electrical stimulator by this method, as the amplifier is shut off during presentation of the stimulus pulse for purposes of stimulus artifact reduction. Software version 8.2 features a Calibration mode, where the artifact reduction feature is turned off.

/100K Loopback Test Fixture
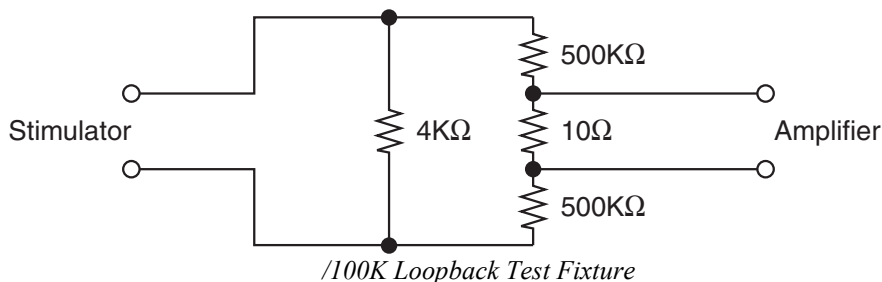
Procedure

1. Select a test mode that uses the electrical stimulator. This might be NCS/MNC or EP/SEP.

2. Set up the following acquisition parameters:

Stimulus
- Rate: 5.3 Hz
- Duration: 1 ms
- Delivery: Recurrent
- Gating: Off
- Mode: Console
- Type: Voltage
- Range 400V

Display
- Timebase: 1 ms/div
- Sensitivity: 1 mV/div
- View Mode: View Input
- Delay: -5 ms

Amplifier
- LFF: 1 Hz
- HFF: 10KHz
- Sensitivity: 1 mV/div

3. Connect the + and - outputs of the electrical stimulator to the input of the load/attenuator test fixture. Connect the attenuator outputs to the + and - inputs of your system's headbox or amplifier module. A connection to Common is not necessary.

4. Set the control panel's Stimulus Intensity knob to maximum, and begin stimulation. If everything is set up correctly, the electrical stimulus pulse should appear on the display. The example below shows the electrical stimulus pulse on a VikingSelect, using the SEP test mode.

5. Turn the Stimulus Intensity knob up and down, and watch for a smooth amplitude transition.

6. Set the stimulus intensity back to maximum, and collect an average of ten sweeps.

7. Using the cursors, measure the voltage levels at the leading and trailing edges (peak and droop points) on the waveform. The peak should be 400V (400V/100,000 = 4mV measured on the screen).

The leading edge tolerance is +20V/-40V. The trailing edge should measure 360V (3.6mV), with a tolerance of +40V/-120V.

8. Change the stimulus duration to 0.1ms. With the Stimulus Intensity knob set to maximum, the stimulus pulse should reach its maximum value of 400V. The rise/fall times of the pulse should be less than 100us.

9. Change the stimulus type to Current with a range of 100mA, and repeat steps 3 - 8.

10. If your system has S403 Stimulus Probes, change the stimulus mode to Remote, and repeat steps 3 - 9.

11. If your system has two stimulator channels, repeat steps 3 - 10 for Channel 2.
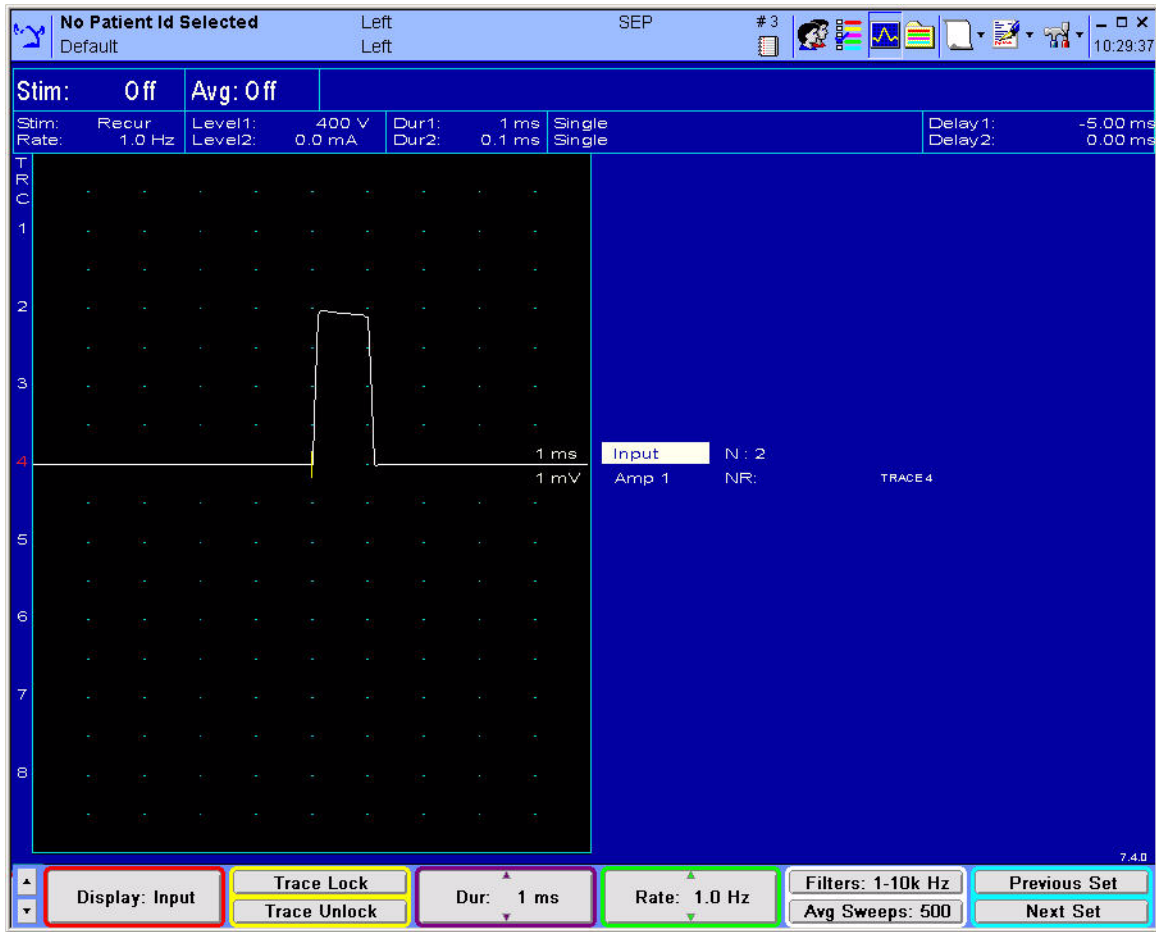
VikingSelect SEP Test Set Up for Measuring Electrical Stimulator Output

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Auditory Stimulator Problems

Confirm that the headphones or other transducers are connected to the correct left or right stimulator jacks on the rear of the console base. Make sure the plugs are fully inserted and seated all the way into their jacks.

Make sure the screen shows a STIM ON condition. If it does not, press the Switch key once or twice. Check the stimulator settings to make sure the desired ear is set to the proper stimulus type and intensity level.

Check that the screen displays the desired stimulus intensity. Try increasing the intensity slightly.

Try applying the stimulus to the other ear. One or both auditory transducers or their cables may have failed. Replace inoperative transducers and broken cables.

Run the USB/FireWire Diagnostics to verify the condition of the auditory stimulator.

Exit the VIASYS application and reenter the test to reset all parameters.

Network Problems

Use this troubleshooting procedure for new installations of a local workgroup, or when adding a new station to an existing network.

Hardware checks

1. Power up and log on to all stations, using the same login (nic/no password, nicolet/no password, or administrator/nicolet).

2. Verify the hub/switch and /or repeater are powered on.

3. Verify the Link lights on the hub/switch and network interface cards are lit.

4. Verify all cable connections are secure.

5. Verify the correct network cables are installed. The recommended type is category 5 UTP.

6. Verify the cable run are within the maximum recommended cable length.

7. Verify each LAN card is seated firmly into the computer expansion slot.

Verify the Windows XP network settings for each system using the following procedure.

Windows XP network settings

1. From the Windows desktop, click on **Start >Programs >Accessories >Command Prompt**. At the C:\ prompt, type **ipconfig /all** and press **Enter**.

2. Verify the correct **Computer Name**, **Workgroup**, and **TCP/IP settings** for each system from the Command Prompt window. Each system must have a unique IP Address (typically 192.168.1.*xxx*). All systems should have the same Subnet Mask (typically 255.255.255.0) and Gateway.

3. Close the *Command Prompt* window.

4. Double-click on **My Network Places**. The *My Network Places* window opens. Verify each system on the network appears in this window.

5. Double-click on each computer icon. A *Computer-name* window opens, showing the shared folders for the selected system. A Nicolet folder should be present for each system.

Cannot log onto another station (previously working)

1. Verify all stations are powered up.

2. Reboot the system. Are the network services loading properly? Watch the screen for error messages.

3. Verify that the Hub and/or Repeater is powered on and that the cable connection is secure. Is the Link OK LED on the hub lighted?

4. If a single station does not come on-line, check the cable connections to that station. Ping the local network card, (**Ping 127.0.0.1**) from the Command Prompt window. Try logging on again.

5. Is there an authentication issue? Verify that all user names and passwords match across all systems being accessed. Passwords are case sensitive.

6. One at a time, swap cables.

Cannot transfer a file over the network

1. Are you having problems transferring a specific file? Try transferring a known good file.

2. Try transferring a file from Windows Explorer or the Network Neighborhood environment, rather than the application. Try Copy and Paste.

3. To verify you have a network problem, try transferring a file locally, for example from hard disk to CDR, Tape backup or floppy.

4. Is the problem specific to one remote systems or all systems?

5. Are all passwords and user names the same across all systems?

Data transfer is exceptionally slow.

You are storing or recalling patient data from the file server, an acquisition station or a review station and the transfer is taking longer than the usual amount of time.

If more than 10 stations are using the network, you may need to wait until that number is reduced. Heavy "traffic" will slow network speed.

Login to the network is denied.

You enter the network password, but the system denies you access to the network.

Verify with the network administrator that you are entering the correct network password.and that you are trying to log into the correct file server for the network.

Newly installed station does not communicate with the rest of the network

Hardware items:

1. Are the remote systems powered on and on-line?

2. Is the hub and/or repeater powered on?

3. Are the correct network cables installed, recommended type is category 5 UTP.

4. Is each LAN card seated securely into the computer expansion slot?

5. Are there any resource conflicts between the LAN card and another component?

6. Is the cable run over the maximum cable length?

7. Are the Link lights lit on the hub/switch and network interface cards?

Software items:

1. Are the network services loading properly? When you logon, watch the screen for error messages. Check the Event Viewer for more information.

2. Are the network services configured properly?

3. Are all necessary protocols loaded?

4. Are the installed protocols configured correctly?

5. Is it possible to ping the local machine (127.0.0.1) or a remote machine? If both ping commands result in a reply message the TCP/IP network is working properly.

6. Do the IP Addresses of each system specify the same network? (i.e.192.168.1.x)

7. Are the subnet masks the same? (255.255.255.0)

Use Network Neighborhood's Find Computer function to search the network for a particular computer name or IP address.

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Blank Page

Error Messages

Error messages may originate from the motherboard's Power On Self Test, the Windows XP operating system, or the applications resident on the system.

Error Messages (P.O.S.T.)

During the boot process, the computer motherboard reports errors in two ways: by sounding a beep code, or by displaying an error message on the monitor. Refer to your computer system's product guide for the specific beep codes and messages unique to your computer.

Error Messages (Windows XP)

Examine the System and Application Event Logs for clues to the source of the error message.

Another source of information for Windows XP-based error messages is the Microsoft Knowledge Database, available on the internet.

Error Messages (NicVue)

"An error has occurred when retrieving the exam size. Check if the file is in use or is missing."

This message appears when:
- The file has been deleted from the hard drive outside of NicVue.
- The file has been moved to a different location on the hard drive outside of NicVue.
- The file is open.
- The file is archived.

"An error has occurred while determining the available disk space."

This message appears when moving exam files (dragging) from one system to another if:
- System A has System B mapped, and no DCM entry exists on System A for System B.
- Networked System B shows a red circle in the System column because System B is offline, System A and System B have different logins, or System B's Nicolet folder is not shared.

"Operation Failed" error message when archiving in NicVue

- If using NicVue's one-button archiving, open Windows Explorer and browse to the **C:\Nicolet\Npa** folder. Double-click on **NicArchCtrl.exe**. In the *Nicolet Device Control Panel* window, change the **Max Drive Speed** from 0 to 8.

- Try archiving to another CD to rule out a possibly bad CD.
- If using *Easy CD Creator*, select **Tools>CD Drive Properties** from the *Untitled - Easy CD Creator* window's menu bar, and select a lower write speed.
- Disable the one-button archive

"Database not available" appears intermittently

This error message has been seen with "slow" or busy networks. One resolution may be to decrease the rate at which NicVue checks for other networked systems. Add FileChkTO = 5000 to the npa.ini file, under the [OPTIONS] header. (Caution!: This change increases time out from 3 to 5 seconds and will result in a slower response.)

"Destination file is invalid or the device is currently unavailable."

This message appears when moving exam files (dragging) from one system to another, if:
- System B is off the network.
- System A is not using the archive server (one-button archiving).
- Attempting to restore from archive when the archiving server (one-button archiving) is turned off in npa.ini.

"Dr. Watson" error message

Open the Event Viewer and review the Application Log for clues to the cause of the message.

Application buttons do not appear on the NicVue Launch Pad.

This symptom has been seen after installing NicVue.

1. Reinstall each application associated with a missing button. (Preferred method) or

2. Modify the npa.ini file to restore the missing button(s).

Cannot access Tools>Database>Settings to modify the main database location

Open the C:\Nicolet\Npa\NPA.opt file with Notepad and modify the main database address in the line beginning "Database=". This is typically the first line under [OPTIONS].

Lost Patient Files

Make sure only one copy of the main database exists, and that all workstations are pointing to that database; there should not be multiple copies of npa.mdb.

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Additionally, disable the "Use local database" option on
the system where the main database resides, and delete
its NpaLocal.mdb file.

Introduction

This section contains an illustrated parts list for the Endeavor CR, VikingQuest and VikingSelect. Each part is considered a Least Replaceable Unit (LRU). An LRU is the lowest level assembly to which you can efficiently troubleshoot and easily replace.

Parts designated with an "F" suffix have been reconditioned.

Accessories

Table 1: Accessories
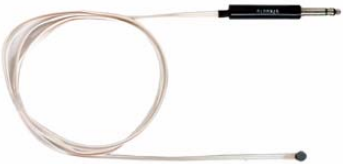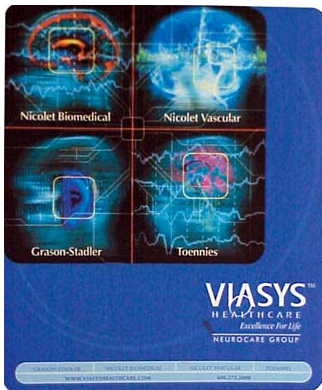
Part No.	Description
143-4094xx	Bag Insert, VQ Carrying Case
842-1192xx VQ	Carrying Case w/ Wheels
842-1283xx VQ	Carrying Case, Portable
842-1226xx	EMG Needle Holder
268-4118xx	EMG Temperature Probe
472-3024xx VQ	EMG Temperature Probe w/ Handle

Table 1: Accessories

Part No.	Description
842-1068xx VQ	Footswitch w/ Cable
842-6250xx VQ	Impedance Meter w/ Manual
222-1219xx ECR, VQ, VS	Pad, Mouse w/ VIASYS Logo

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Amplifiers

Table 2: Amplifier
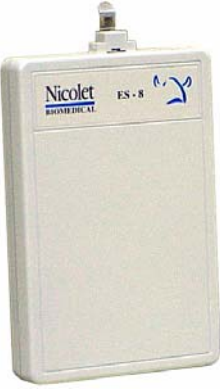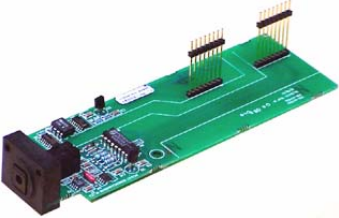
Part No.	Description
842-1268xx(F) ECR	Amplifier, 16-Chn Endeavor CR
842-1272xx VQ	Amplifier, 2-Channel
713-4110xx(F) VS	Amplifier, 2-Channel

Table 2: Amplifier

Part No.	Description
842-1273xx VQ	Amplifier, 4-Channel
713-4107xx(F) VS	Amplifier, 4-Channel
713-4090xx(F) VS	Amplifier, 8-Channel

Boards

Table 3: Boards

Part No.	Description
312-6178xxx ECR, VQ International customers may order this as an "F" part.	Board, Auditory Stimulator
512-2137xx ECR	Board, ECR Connector
512-6153xx VQ International customers may order this as an "F" part.	Board, Temperature

Cables

Table 4: Cables

Part No.	Description
085-4577xx ECR	Cable Set, AC Mains, USA
085-4581xx ECR, VQ	Cable, USB 2.0, 20 in.
085-4258xx VQ	Cable, Amp Interface, 2m
085-4460xx VQ	Cable, BNC M/M RG59U, 15 ft.
085-7481xx VS	Cable, Control Panel (VS)
085-4599xx ECR	Cable, Fan w/ 12 in. wire
085-4526xx VS	Cable, FireWire 1 m.

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Table 4: Cables

Part No.	Description
085-4527xx VS	Cable, FireWire 2.5 m.
085-4528xx VS	Cable, FireWire, 4.5 m.
085-4576xx 085-4580xx ECR	Cable, Headbox External, 6 ft. Cable, Headbox External, 5 m.
085-4573xx ECR	Cable, Internal Fan
085-4575xx ECR	Cable, Main Power
085-4578xx ECR	Cable, MC-1 Connector
085-4564xx VS	Cable, Modular Connect, 20ft.

Part No.	Description
085-4367xx VQ	Cable, Non isolated Base
085-4567xx ECR	Cable, Portable Amplifier, 20 ft.
085-7594xx	Cable, Power IEC-M to NEMA-F, 1 ft.
085-4265xx VQ	Cable, Power, 12 in.
085-4591xx ECR, CQ	Cable, Power, Dell D505
085-4266xx VQ	Cable, Power, 3 ft., USA

Table 4: Cables
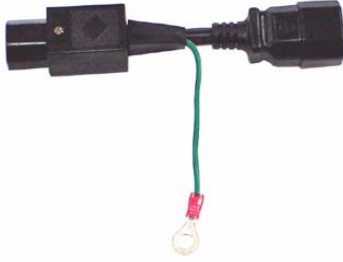
Part No.	Description
085-4595xx	Cable, Power, AC w/ Pigtail
085-4357xx VQ	Cable, Power, G2 Cart, LCD to Computer
085-4081xx	Cable, Power, Monitor, 1 m.
085-4247xx ECR	Cable, Power, USA
085-4593xx Halyron Computer	Cable, SATA HD 15 in., 90 degree
085-4509xx VS	Cable, Stim DC Power, 6ft.
085-4515xx VS	Cable, Stim Interface, 22in.

Part No.	Description
085-4511xx VS	Cable, Stim Interface, 8ft.
085-4507xx ECR, VQ	Cable, USB 2.0, 2 meter
085-4134xx ECR	Speaker Assembly

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Carts

Table 5: Carts

Part No.	Description
842-1274xx	Amp Arm, VQ USB Portable
472-1034xx	Amp Arm, VS
116-4220xx VS	Bracket, G2 Cart, AS-1
116-4222xx VS	Bracket, G2 Cart, IES-16, Left
116-4223xx VS	Bracket, G2 Cart, IES-16, Right
116-4221xx VS	Bracket, G2 Cart, IES-2
116-4219xx VS	Bracket, G2 Cart, SC-1
071-4173xx VS	Bracket, UniBody Cart, AS-1
011-4334xx VQ	Bracket, UniBody Cart, Footswitch
071-4174xx VS	Bracket, UniBody Cart, IES-16
071-4172xx VS	Bracket, UniBody Cart, IES-2

Part No.	Description
071-4175xx VS	Bracket, UniBody Cart, SC-1
842-1236xx VS	Cart, G2
842-1286xx ECR, VS	Cart, UniBody

Table 5: Carts

Part No.	Description
842-1286xx ECR, VQ	Cart, UniBody for portable system w/ storage bin & hooks
842-1279xx VQ	Cart, UniBody w/ Footswitch Bracket
842-1280xx VQ	Cart, UniBody w/ Footswitch Bracket and Monitor Support
842-1281xx VQ	Cart, UniBody w/ Monitor Support and Printer Shelf
132-4008xx VQ	Caster, 5 in., Rigid Square Post
132-4009xx VQ	Caster, 5 in., Swivel Square Post

Part No.	Description
040-4062xx	Clamp, Amplifier Arm
112-7024xx	Extrusion, Cable Raceway
071-4198xx	Holder, VQ Amplifier
698-6199xx VQ	Kit, UniBody Cart, Locking Caster
698-6213xx VQ	Kit, UniBody Cart, Shelf Option
060-4022xx VQ	Post, Cart Amplifier Arm

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Table 5: Carts

Part No.	Description
060-4006xx VQ	Post, Extension Arm
698-6213xx	Shelf, Additional, UniBody Cart
116-4139xx VQ	Support, Cart Monitor
116-4259xx	Support, UniBody Cart, Power Strip

Computers

Table 6: Computers
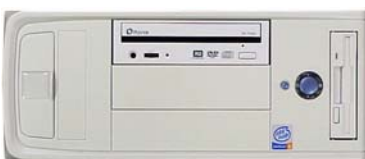
Part No.	Description
222-4593xx(F) VS	Computer, BCM, Pentium 4, 2.0GHz or higher, BC845DL Motherboard, 256MB RAM
222-4677xx ECR	Computer, Dell Latitude D505 Laptop
222-4658xxF ECR	Computer, Halyron, Pentium 4, 3.2GHz, 512MB RAM w/CDR
222-4681xxF ECR	Computer, Halyron, Pentium 4, 3.2GHz, 512MB RAM w/DVD
222-4684xx	DIMM 256MB DDR, 400MHz

Table 6: Computers

Part No.	Description
072-4009xx	Fan, 70mm forDC865G Halyron Computer
072-4008xx	Fan, 60mm for DC865G Halyron Computer
041-4048xx	Speakers, Multimedia, 5.25 in Bay, Internal

Documentation

Table 7: Documentation

Part No.	Description
269-5513xx	2015 Visual Stimulator User Guide
269-5884xx	Endeavor CR (ECR) Pocket Guide, English
269-5885xx	ECR Read Me First Installation Guide
269-5880xx	ECR Reference Manual
269-5881xx	ECR Templates guide
269-5879xx	ECR User Guide, English
408-4015xx	ECR Workbook
269-5824xx	NicVue 2.5 Upgrade Instructions
269-5918xx	VikingQuest (VQ) AEP User Guide, V8.0
269-5926xx	VQ MMP User Guide, V8.0
269-5915xx	VQ NCS User Guide, V8.0
269-5920xx	VQ P300A User Guide, V8.0
269-5930xx	VQ Pocket Guide, V8.0, English
269-5916xx	VQ QEMG User Guide, V8.0
269-5929xx	VQ Read Me First Installation Instructions, V8.0
269-5922xx	VQ Reference Values User Guide, V8.0
2695925xx	VQ Report MSW User Guide, V8.0
269-5917xx	VQ SEP User Guide, V8.0
269-5921xx	VQ SFEMG User Guide, V8.0
269-5927xx	VQ User Guide, V8.0, English
269-5919xx	VQ VEP User Guide, V8.0
269-5928xx	VQ Reference Manual, V8.0
269-5690xx	VikingSelect Report MSW User Guide, V7.0

Table 7: Documentation

Part No.	Description
269-5703xx	VS AEP Plus User Guide, V7.0
269-5769xx	VS CVD User Guide, V7.1
269-5705xx	VS EP User Guide, V7.0
269-5770xx	VS ERG/EOG User Guide, V7.1
269-5710xx	VS Installation Guide, V7.0
269-5699xx	VS IOM User Guide, V7.2
269-5700xx	VS IOM w/ PEEG User Guide, V7.0
269-5688xx	VS Master User Guide, V7.2
269-5706xx	VS MMP Plus User Guide, V7.0
269-5707xx	VS MUNE Workbook
269-5692xx	VS NCS Basic User Guide, V7.0
269-5691xx	VS NCS Plus User Guide, V7.0
269-5693xx	VS NCS Reference Guide, V7.0
269-5792xx	VS Networking Guide
269-5701xx	VS P300A User Guide, V7.0
269-5689xx	VS Pocket Guide, V7.0
269-5697xx	VS QEMG User Guide, V7.2
269-5687xx	VS Reference Guide, V7.2
269-5694xx	VS Rep. Stim User Guide, V7.0
269-5702xx	VS SEP Plus User Guide, V7.0
269-5698xx	VS SFEMG User Guide, V7.0
269-5695xx	VS SPA/MVA User Guide, V7.0
832-0203xx	VS User Manual Set, V7.0
269-5704xx	VS VEP Plus User Guide, V7.0

Parts List

Drives

Table 8: Drives

Part No.	Description
713-4122xx VQ	CD-R/W w/ Software
222-4657xx ECR	DVD Recorder
222-1134xx ECR, VS, VQ	Floppy, 1.44MB, 3.5-in.
222-4665xx VQ	Floppy, USB for Laptop
222-46856xx ECR, VS	Hard Disk, Serial ATA, 160GB

Table 8: Drives

Part No.	Description
222-4685xx VQ	Hard Disk, Serial ATA, 80+GB

Fuses/Lamps

Table 9: Fuses/Lamps

Part No.	Description
070-7175xx	Fuse, 2A, 5x20, Time Lag
070-7185xx	Fuse Holder

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Headboxes

Part No.	Description
842-1207xx VS	ET-16A Headbox
842-1208xx VS	ET-16B Headbox
842-1269xx ECR	HB-1 Headbox
842-1271xx ECR	HB-2 Headbox

Keyboards/Consoles

Table 11: Keyboards/Consoles

Part No.	Description
842-1266xx ECR	MC-4 Mini Control Panel
222-4127xx VQ	Keyboard, 83 Key, Low Profile, English
222-4644xx ECR, VS	Keyboard, 104 Key, PS/2
222-4639xx ECR, VS	Mouse, 2-Button Optical w/ Wheel, USB

Parts List

Mechanical

Table 12: Mechanical

Part No.	Description
698-6083xx	Clamp Kit, Universal Monitor Support
472-1039xx ECR	Cover Assembly, Endeavor CR
042-4169xx ECR	Cover, Endeavor CR Cable Tray
042-4115xx ECR	Cover, Fan 1.57 Square
049-4017xx	Handle, Molded Black Plastic

Table 12: Mechanical

Part No.	Description
122-4120xx ECR	Insert, Soft Storage
109-4011xx ECR	Latch, Chrome w/ Lock
116-4225xx ECR	Support, Endeavor CR Feet
016-4228xx VQ	Support, Laptop Extension
025-4007xx ECR	Switch, Rocker DPST 120VAC

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Miscellaneous

Table 13: Miscellaneous

Part No.	Description
089-4006xx	Battery, CR2023 3-volt lithium

Modules

Table 14: Modules

Part No.	Description
672-1057xx(F) ECR	Base Assembly, Endeavor CR Complete Base
713-4141xx(F) VQ	Base Assembly, VikingQuest w/ Auditory Stimulator
713-4140xx(F) VQ	Base Assembly, VikingQuest without Auditory Stimulator

Monitors

Table 15: Monitors

Part No.	Description
842-6717xx ECR, VS	LCD Flat Panel, 17 in.
222-4483xx(F) VQ	LCD Flat Panel, 18 in.
842-6646xx ECR, VS	LCD Flat Panel, 19 in.

Network

Table 16: Network

Part No.	Description
	No Entries

Options

Table 17: Options

Part No.	Description
	No Entries

Power Supplies

Table 18: Power Supplies

Part No.	Description
222-4680xx	Power Strip, Medical Grade
642-6031xx ECR, VQ	Power Supply, 500VA, 115VAC UniBody Cart

Table 18: Power Supplies

Part No.	Description
642-6032xx ECR, VQ	Power Supply, 500VA, 230VAC UniBody Cart
113-4046xx ECR, VQ	Power Supply, Condor GLM65B 90-264V
713-4133xx(F)	Power Supply, G2 Cart, 120VAC
713-4134xx(F)	Power Supply, G2 Cart, 220VAC
113-4048xx	Power Supply, Halyron Computer, 180W

Printers

Table 19: Printers

Part No.	Description
842-6716xx ECR, VQ, VS	HP DeskJet B/W & Color Printer w/ Cable
842-1177xx ECR, VQ, VS	OkiData Laser Printer

Software

Table 20: Software

Part No.	Description
688-1166xx	Endeavor CR Acquisition Software Upgrade
842-0382xx	Endeavor CR Review Software Package
688-1167xx	Endeavor CR Review Software Upgrade
222-4679xx	MS Office 2003 Standard
828-0394xx	Multi-Language Interface Software (for Windows XP only)
482-6362xx	Nicolet XP Drivers/Settings CD
828-0398xx	NicVue Patient Administration

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Part No.	Description
222-4064xx	Roxio East CD Creator Software Package
828-0427xx	VQ AEP Software Package
682-1014xx	VQ License Disk (2)
828-0411xx	VQ Master Software Package
828-0425xx	VQ MMP Software Package
828-0423xx	VQ NCS Reference Values Software Package
828-0418xx	VQ NCS/EMG/3-Modality EP/ Report MSW Bundle
828-0416xx	VQ NCS/EMG/Report MSW Bundle
828-0419xx	VQ NCS/EMG/Report MSW Bundle
828-0420xx	VQ NCS/EMG/Report MSW Bundle
828-0421xx	VQ NCS/EMG/Report MSW Bundle
828-0417xx	VQ NCS/EMG/SEP/ Report MSW Bundle
828-0335xx	VQ Networking Software Package
828-0429xx	VQ P300A Software Package
828-0426xx	VQ SEP Software Package
828-0424xx	VQ SFEMG Software Package
828-0428xx	VQ VEP Software Package
828-0319xx	VS EMG Software Package (SPA, MVA)
828-0376xx	VS EOG/ERG Software Package
828-0322xx	VS EP Plus Software Package (3-Modality)
828-0321xx	VS EP Standard Software Package (3-Modality)
828-0328xx	VS IOM Software Package

Table 20: Software

Part No.	Description
828-0329xx	VS IOM w/ Processed EEG Software Package
828-0327xx	VS MMP Plus Software Package
828-0315xx	VS NCS Reference Values Software Package
828-0390xx	VS NCS Software Package
828-0332xx	VS NCS/EMG Bundle
828-0326xx	VS P300A Software Package
828-0318xx	VS QEMG Plus Software Package (QMUP, QMVA, QNS, AMUP, IPA)
828-0317xx	VS QEMG Software Package (QMUP, QMVA, QNS)
828-0330xx	VS Report MSW Software Package w/ MS Office
828-0339xx	VS Report MSW Software Package w/o MS Office
828-0323xx	VS SEP Plus Software Package
828-0320xx	VS SFEMG Software Package

Stimulators/Transducers

Table 21: Stimulators/Transducers

Part No.	Description
672-1052xx(F) VS	AS-1 Auditory Stimulator

Parts List
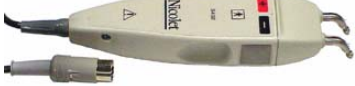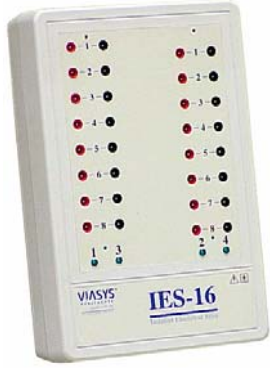
Part No.	Description
842-2026xx	Bone Vibrator Transducer, 300 ohm
842-1150xx VQ, VS	Current Stimulator Probe w/ Remote Push button & Intensity Wheel, S403
842-1151xx ECR VQ, VS	Current Stimulator Probe, No Remote Controls, S402
VQ	ES-1 Electrical Stimulator

Table 21: Stimulators/Transducers

Part No.	Description
842-2023xx	Headphones, TDH39 300 ohm, Shielded
842-2027xx ECR, VQ, VS	Headphones, TDH39P 300 ohm, Unshielded
672-1051xx(F) VS	IES-16 Electrical Stimulator
672-1050xx(F) VS	IES-2 Electrical Stimulator

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Part No.	Description
842-1065xx ECR VQ, VS	LED Goggles, Nic 105A w/ 15 ft. Cable
033-4071xx	Probe Head, Curved
033-4095xx	Probe Head, Female, 1.5mm
033-4060xxx	Probe Head, Male
672-1049xx(F) VS	SC-1 Stimulus Controller

Table 21: Stimulators/Transducers

Part No.	Description
842-1267xx ECR	SP-1 Stimulus Pod
842-1270xx ECR	SP-2 Stimulus Pod
041-7040xx	Tubal Insert Earphones, TIP300

Systems

Table 22: Systems

Part No.	Description
	No Entries

Upgrades

Table 23: Upgrades

Part No.	Description
	No Entries

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